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STEEL

ESTABLISHED 1882

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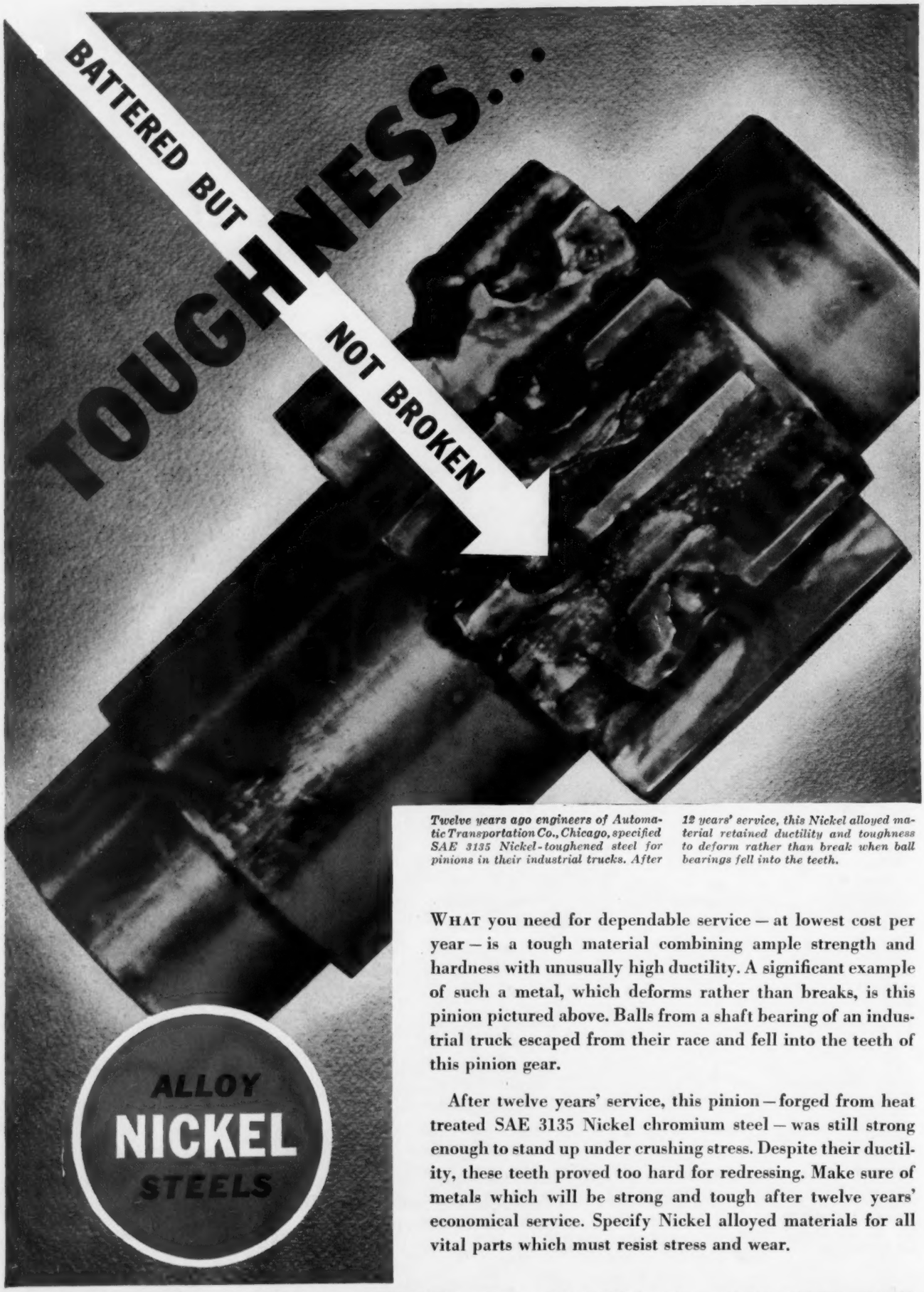
PRODUCTION • PROCESSING • DISTRIBUTION • USE



Twelve years ago engineers of Automatic Transportation Co., Chicago, specified SAE 3135 Nickel-toughened steel for pinions in their industrial trucks. After 12 years' service, this Nickel alloyed material retained ductility and toughness to deform rather than break when ball bearings fell into the teeth.

WHAT you need for dependable service — at lowest cost per year — is a tough material combining ample strength and hardness with unusually high ductility. A significant example of such a metal, which deforms rather than breaks, is this pinion pictured above. Balls from a shaft bearing of an industrial truck escaped from their race and fell into the teeth of this pinion gear.

After twelve years' service, this pinion — forged from heat treated SAE 3135 Nickel chromium steel — was still strong enough to stand up under crushing stress. Despite their ductility, these teeth proved too hard for redressing. Make sure of metals which will be strong and tough after twelve years' economical service. Specify Nickel alloyed materials for all vital parts which must resist stress and wear.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

As the Editor Views the News

■ LAST WEEK steel production (p. 23) moved up another point and now stands at 92 per cent of ingot capacity. On the basis of present capacity, this represents the greatest tonnage production rate in history. Increasing volume of business (p. 75) is being placed for first quarter despite absence of definite prices. Mills continue besieged for quick delivery and warehouses are receiving many orders that ordinarily would go to mills. Some mills still find their incoming orders exceed their output. Railroads continue heavy buyers. Consumption in general is mounting, with the exception of the labor-harassed automobile industry. Steel export demand is increasing sharply. First foreign order for military materials calls for several thousand military trucks for the French government.

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Profits Higher

Twelve steel companies showed net profits in third quarter (p. 21) approximately double those of the second quarter. Many typical metalworking companies (p. 22) show comparable profits. . . . Mr. Grace (p. 21) does not see the necessity for important increases in steel prices. . . . Expansion programs are assuming greater prominence (p. 35) in the current news of the steel industry. Expansion (p. 29) continues the order of the day in the airplane industry, in the machine tool industry. . . . Wire requirements appear beyond the resources of the wire industry, particularly in the case of army needs, says (p. 18) an army spokesman. . . . For national defense, says the assistant secretary of war (p. 26), industrial plants should be much more widely distributed than at present.

• • •

Closed Shop Real Issue

Record breaking attendance (p. 15) featured the 1939 Metal Congress and Exposition and interest in the exhibits was heightened because of the prevailing high rate of industrial activity. The 1940 congress and show will be held in Cleveland, third week in October. . . . Names of witnesses who will testify at the temporary national economic committee's steel hearings (p. 26) are announced. Competition, the price basing system, iron ore will have major attention. . . . While production speeds have been made the public issue in the current Chrysler-UAW dispute, insiders (p. 31) know that the real issue is simply the closed shop, or a guarantee of the continuation of the union's income and power. . . . Sales of gas for industrial purposes now exceed (p. 19) those to domestic users.

• • •

Producing Sponge Iron

Sponge iron has been produced successfully in the laboratory in a two-diameter, batch-type, direct-fired rotary kiln operating on 65 pounds of a mixture of 100 parts iron ore and 60 of coal. Almost complete reduction of iron oxides was attained consistently. An authority (p. 48) regards the method as satisfactory for commercial application. . . . Research aimed at finding less expensive materials for low-temperature service have shown (p. 52) that nickel-molybdenum steels have great potentialities. . . . Much leaded steel now on the market, says a metallurgist, does not have the lead in the required fine particles and even distribution, resulting (p. 55) in much rough machining and tool trouble. . . . An open-hearth ladle of 140 tons capacity (p. 64) is of all-welded construction.

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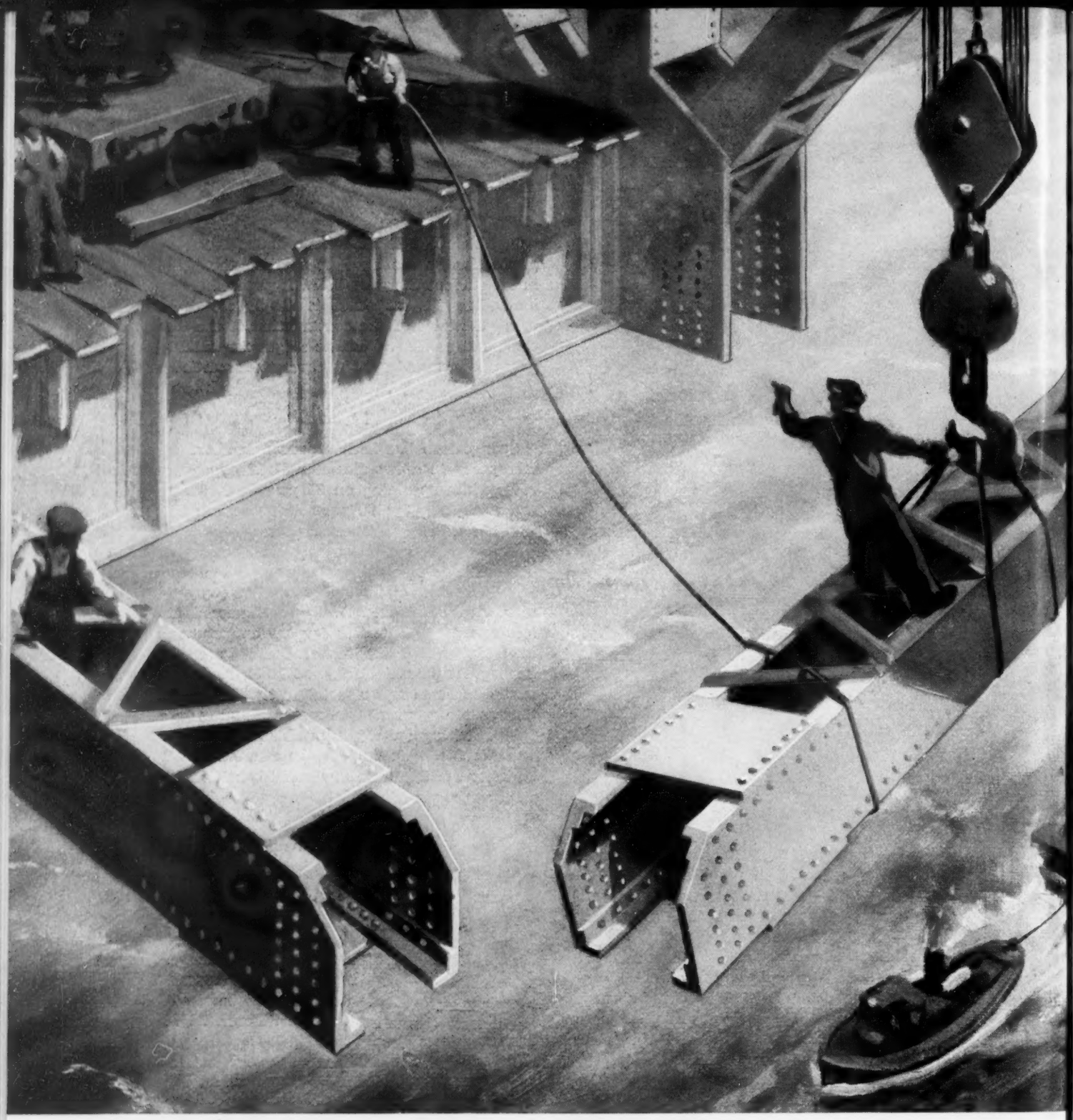
Manganese 99.94 Pure

Now in commercial operation is a new process (p. 42) for making manganese metal with a purity of 99.94. Its properties are entirely different from those of ferromanganese, spiegeleisen and crude metallic manganese, implying new metallurgical developments. It may be used on low-grade domestic ores. . . . Magnetic carbon determinations are made rapidly by one steel company by means of a newly developed instrument said (p. 67) to be sufficiently accurate. . . . STEEL presents (p. 40) a number of interesting new machine tools which permit more efficient performance of a wide variety of operations. . . . A steel fabricator has reduced costs 35 per cent by using welding (p. 60) to position truss members. . . . New equipment for heat treating special purpose wire (p. 56) has extremely close control.

E C Kreutzberg



INLAND STRUCTURAL STEEL

For many years a leading supplier of structural steels, Inland produces a wide range of Standard Structural Shapes under A.S.T.M. Specifications, as well as many special sections used in the fabrication of equipment. If you have a problem in selection or design, Inland will be pleased to co-operate with you. INLAND STEEL COMPANY, 38 S. Dearborn St., Chicago. District Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City, Cincinnati.

SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BAR

Record Attendance, Largest Number of Exhibits Feature Metal Congress

CHICAGO

■ REVIVAL of business activity in recent weeks proved a stimulating influence on the twenty-first annual National Metal congress and exposition here, Oct. 23-27.

On every hand, wherever executives, metallurgists, engineers and technicians gathered in technical sessions, business meetings, committee groups, lectures and social events, was evidenced the optimism that is dominant only when productive facilities are engaged at somewhat near normal capacity.

Direct proof of the better times being enjoyed throughout the industry was the keen interest and record-breaking attendance at the show and in convention sessions. Registration for the several participating organizations and for the exposition approached the 25,000 mark, and this in spite of the fact admissions to the various exhibits were carefully restricted.

The exposition in International Amphitheatre afforded 80,000 square feet of exhibits which covered the full range of ferrous and nonferrous metals, and equipment used in their treatment, fabrication, testing and inspection. This was the largest exclusively metal show yet held.

Exhibitors totaled 267, also a new high point, this figure comparing with about 250 in Detroit last year. Each year exhibitors improve their showmanship with their artistically designed booth settings and modes of displaying their products. Modernistic creations, wide use of color and illumination, moving displays, and the like, added much to the attractive appearance of this year's exposition.

Fifth Held in Chicago

This was the fifth time the congress and exposition was held in Chicago. The show was born in this city in 1919. Return events were staged in 1926, 1930 and 1935.

American Society for Metals was principal sponsor and originator of the congress and exposition. Cooperating in the program of technical sessions and related functions were the American Welding society, conducting its twentieth annual meeting; American Institute of Mining and Metallurgical Engineers, with the fall meetings of its Institute of Metals and Iron and Steel divisions; and the Wire association, holding its annual meeting.

American Society for Metals' program included 12 technical sessions, the annual business meeting, the Edward De Mille Campbell memorial lecture, a five-period lecture course on the functions of alloying elements in steel, a three-period course on visual examination of steels, and the annual banquet. Three of the 12 technical sessions constituted a symposium on the precipitation or age-hardening of metals with 11 papers devoted to various phases. More than 500 society members were enrolled in the course on alloying elements in steel held late each afternoon and presented by Dr. E. C. Bain, assistant to vice

■ **Exhibits occupying approximately 80,000 square feet of floor space made the twenty-first National Metal exposition in Chicago last week, the largest yet held. Here is shown the arena area in International Amphitheatre. Visitors thronged the show for five days inspecting latest developments in metals, metalworking, metal processing and testing equipment, displayed by 267 exhibitors**

president, United States Steel Corp., Pittsburgh. About 275 attended the lectures on visual examination of steel conducted on the first three evenings of the week by Dr. G. M. Enos, professor of metallurgy, University of Cincinnati, Cincinnati. This is the sixth year that the society has provided educational activities during the convention and each year these grow in popularity—last week's enrollments setting new records.

About 600 members attended the society's twenty-first annual meeting at the Palmer House, Wednesday morning. President William P. Woodside, vice president in charge of research, Climax Molybdenum Co., Detroit, presided.

Successful Year Reported

Another gratifying year in the history of the society was reported by President Woodside. Highlights were purchase of permanent headquarters in Cleveland, to be occupied Jan. 1, 1940; publication of the 1939 *National Metal Handbook* in April, a volume considerably enlarged over the 1936 edition; and inauguration of a new nation-wide employment service effective Oct. 15. Mr. Woodside complimented the chapters on their extensive programs which in nearly all cases involve educational activities.

Dr. Bradley Stoughton, professor of metallurgy, Lehigh university, Bethlehem, Pa., and national treasurer, reported a substantial increase in the reserves of the society and a satisfactory status of its 50 individual chapters. Secretary William H. Eisenman, Cleveland, announced membership of the organization now totals 10,220, as compared with 9923 one year ago, and establishing a new all-time high. The previous peak of 10,028 was set two years ago.

The 1940 National Metal congress and exposition will be held in Cleveland, third week in October, with the show in Public auditorium.

James P. Gill
Elected president of the American Society for Metals

The Robert M. Bird bell and gavel, awarded annually to the chapter which has performed outstanding work and been of most service to the national society in the past year, was presented by President Woodside to the Cincinnati chapter. Basis of the award was notable educational work and sponsorship last spring of the trichapter meeting of the Columbus, Dayton and Cincinnati chapters. The bell was accepted by Chapter Chairman J. P. Caine, Sawbrook Steel Castings Co., Cincinnati.

Install New Officers

New officers nominated last May were declared elected and assumed their positions during the convention. James P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa., became the new president, succeeding Mr. Woodside.

Dr. Oscar E. Harder, assistant director, Battelle Memorial institute, Columbus, O., succeeded Mr. Gill as vice president. Dr. Kent R. Van Horn, research metallurgist, Aluminum Co. of America, was elected treasurer for two years, succeeding Dr. Stoughton.

Two new trustees, elected for two years, are Dr. Marcus A. Grossmann, director of research, Chicago district, Carnegie-Illinois Steel Corp., Chicago, and Herbert J. French, in charge of alloy steel and iron development, International Nickel Co. Inc., New York.

At the close of the annual meeting, Edmund S. Davenport, in charge of metallurgical work, research laboratory, United States Steel Corp., Kearny, N. J., presented the 1939 Edward De Mille Campbell Memorial lecture, his subject being "The Isothermal Transformation in Steel." Mr. Davenport was introduced by R. E. Zimmerman, vice president in charge of research, United States Steel Corp., Pittsburgh.

1200 at Annual Banquet

Approximately 1200 members of the society and their guests attended the banquet at the Palmer House, Oct. 26. President Woodside presented the Past President's medal to Dr. George B. Waterhouse, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., who served as president in 1937-38.

President Woodside presented the Henry Marion Howe gold medal to Charles S. Barrett, metals research laboratory and department of metallurgy, Gerhard Ansel, assistant in metals research laboratory, and Robert F. Mehl, director of metals research laboratory and head of the department of metallurgy, Carnegie Institute of Technology, Pittsburgh. This medal is awarded for the best

Gerhard Ansel
Co-recipient of Henry Marion Howe Gold Medal of the American Society for Metals

Robert F. Mehl
Co-recipient of Henry Marion Howe Gold Medal of the American Society for Metals

Charles S. Barrett
Co-recipient of Henry Marion Howe Gold Medal of the American Society for Metals

paper published in the society's *Transactions* in the year preceding the convention. The contribution winning the awards was "Slip, Twinning and Cleavage in Iron and Silicon Ferrite," presented at Cleveland convention in 1936 and published in *Transactions* for September, 1937.

The Albert Sauveur Achievement award was given to Stanley P. Rockwell, president, Stanley P. Rockwell Co., Hartford, Conn., "in recognition of his pioneering metallurgical achievements which have stimulated organized research work along similar lines to such an extent that a marked basic advance has been made in metallurgical knowledge." Mr. Rockwell is widely known for his invention of the Rockwell hardness tester and his work with dilatometry. Dr. E. C. Bain introduced Mr. Rockwell for the award.

Honorary membership in the society was conferred upon Dr. Zay Jeffries, technical director, incandescent lamp division, General Electric Co., Nela Park, Cleveland. Dr. Jeffries, a past president, was introduced by Past President R. C. Archer, chief metallurgist, Chicago district, Republic Steel Corp., Chicago. Founder membership was conferred upon Col. A. E. White, director, department of engineering research, University of Michigan, Ann Arbor, Mich. Dr. White, also a past president of the society and an important figure in its establishment 21 years ago, was presented for the honor by Secretary W. H. Eisenman.

Desvernine Addresses Banquet

As principal speaker at the banquet, R. E. Desvernine, president, Crucible Steel Co. of America, New York, urged scientists and engineers to "debunk the modern bunk" that industry has been antisocial and antidemocratic. Taking as his subject "Science and Steel in Industrial Democracy," Mr. Desvernine asserted that the steel industry needs to yield to no one on the economic front. It is better equipped and manned today to do its bit than ever before.

Technological progress always means economic progress, he emphasized. The metal industry is one of the pillars upon which the foundation of present civilization is built. Discoveries in use of basic metals have done as much to mold and redesign our present ways of life as any other single force. Newly discovered uses of natural forces and resources release new economic and industrial forces, but whether these are to be a benefit to the human race or destructive to it, depends upon the use which human beings make of their discoveries.

In the last decade, Mr. Desvernine continued, we have witnessed unprecedented assumption by government of political controls over all economic and social activities. Practically every basic productive, distributive and financial agency of our commercial life already is subject to some government control.

Stanley P. Rockwell
Received Albert Sauveur Achievement Award, American Society for Metals

War, he declared, would temporarily, if not permanently, sound the death knell of the free enterprise system. Even neutrality might prove disappointing, for preservation of modern neutrality seems to require a wider use and expansion of government controls.

Scientists must fight on the economic and social front of industrial democracy—the free enterprise system. The impression that scientific progress and mechanization of industry produces unemployment must be refuted. The speaker cited statistics to prove that in the period 1900 to 1939 jobs increased faster than population, that actual earnings increased with a greatly reduced work week and production per man-hour increased. On the record, machines have not displaced men and decreased gainful employment. Therefore, "we who invent, produce and operate machines cannot let this fetish continue that mechanical progress is antisocial.

"Idle machines, not busy machines produce unemployment. And you can't blame idle machines on 'Big Business,' as only busy machines can make profits." The field of greatest profit, Mr. Desvernine pointed out, lies in reduction of production costs with improved quality and wider applications and consumer uses of steel. With taxes and labor at frozen levels, we can profit only by reducing direct production costs and these costs are basically scientific problems.

In conclusion, the speaker warned that if industry is to be expected to go "over the top" it must have the sympathetic understanding of the voters, as it is the voters who make and control our government.

Stanley P. Watkins
Awarded Wire association medal

Use Citizenship, A.I.M.E. Advised

LARGE attendance and widespread interest in the numerous technical sessions featured the annual fall meeting of the Institute of Metals, and Iron and Steel divisions of the A.I.M.E. Institute of Metals division's program covered a wide range of subjects relating to die casting alloys, cast brass and bronze, and metallography of nonferrous materials. Iron and Steel division's program likewise was broad, and dealt with stainless steel, magnetic methods, nitrogen in iron, and desulphurization of pig iron.

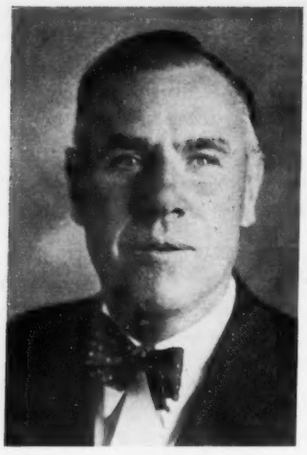
Dinner Features Meeting

Feature of the three-day meeting was the annual autumn dinner Oct. 24. More than 200 members and guests were present. J. Hunter Nead, Inland Steel Co., Chicago, and chairman, Iron and Steel division, was toastmaster, and called upon Wilfred Sykes, assistant to the president, Inland Steel Co., who made the address of welcome. He then introduced R. H. Leach, Handy & Harman Co., New York, and chairman, Institute of Metals division, who presented the response. Other prominent guests present included W. M. Pierce, New Jersey Zinc Co., Palmerton, N. J., who conveyed greetings of the national officers of A.I.M.E.; W. P. Woodside, Climax Molybdenum Co., Detroit, and retiring president of A.S.M., who conveyed greetings of that organization, and W. H. Eisenman, secretary, A.S.M.

Main speaker of the evening was C. M. White, vice president in charge of operations, Republic Steel Corp., Cleveland, whose subject was "Cit-

G. O. Hoglund
Co-recipient of Lincoln Gold Medal of the American Welding society

G. S. Bernard Jr.
Co-recipient of Lincoln Gold Medal of the American Welding society



C. J. Holslag
Awarded Samuel Wylie Miller Memorial Medal, American Welding society

izenship." Most Americans, he said, have too vague an idea of what citizenship means. They think that if they vote and obey the laws that they have fulfilled their obligations.

However, said Mr. White, citizenship is a serious right, and one to be guarded jealously.

Mr. White urged every one to take his politics and citizenship positively. Each individual should take time to go out and seriously try to elect the candidate he thinks will do a job as it should be done. As a citizen he should sponsor and encourage issues in which he believes.

Time is coming, due to a certain extent to the increased interest which government takes in business, when business men must begin to take an equal amount of interest in government, Mr. White continued. That is a possibility which may reach fruition unless the country becomes embroiled in the European war, and with that comes the end, temporarily at least, of political freedom.

Wire Capacity Shortage Seen

■ MOTION pictures of Boulder dam and transmission lines and a sound film showing Swedish steel wire manufacture featured the annual meeting of the Wire association.

Before showing the Boulder dam pictures, Dr. D. M. Simmons, chief engineer, General Cable Corp., New York, spoke briefly on the functions of the intake towers, outlet works, penstocks, power plant, spillway, and gave a brief description of the outstanding features of the transmission lines. Two reels of pictures showed dam construction, transmission tower erection, cable manufacture and the erection of cable on the towers.

The sound picture showed one of the oldest and largest steel mills in Sweden, Uddeholm's A. B. with its 10,000 employes. Company employs electric blast furnaces for producing iron and ferroalloys, acid open hearths and electric furnaces for steel melting. Members saw steel being made that approaches gold in value, has unusual properties.

Two plants were inspected, Hawthorne works of Western Electric Co. and Republic Steel Corp.'s new wire mills.

Wins Award for Best Paper

Wire association's annual medal for the most meritorious paper on wire manufacture or fabrication during the year was awarded S. P. Watkins, manager, sales development, Rustless Iron & Steel Corp., Baltimore.

At the annual meeting it was announced present membership totals 385, a gain of 53 in the past year.

The 1940 convention of the association will be held in conjunction with the American Society for Metals in Cleveland. Headquarters will be at the Carter hotel.

Maj. Gen. J. O. Mauborgne, chief signal officer, United States army, reviewed steps taken in production planning to secure an estimate of wire output in this country. He pointed out that the direct requirements of the war department embraced 337 different items of wire and wire products.

In speaking on wire for communication purposes, he explained the army in case of war will require literally mountains of wire in view of widespread destruction during air raids. Wire must continue to carry the load of military communication and if the military machine is to function at its best, he warned, there must be a co-ordination between wire and cable.

He announced wire requirements at present appear to be beyond the resources of wire manufacturers, particularly in the case of army needs. Signal equipment alone involves about 30,000 items. He advised the scrutiny, planning and checking of all wire production and correlation of all the factors involved.

George T. Horton
Elected president of the American Welding society

Miller Medal To C. J. Holslag

■ WITH first few days' registration above that of last year, total attendance at twentieth annual meeting, American Welding society, Chicago, Oct. 22-29, amounted to 1240, a new record.

Active members totaled 3693 Oct. 1, a gain of 155 in the past year, according to the retiring president, H. C. Boardman, Chicago Bridge & Iron Co., Chicago. New sections were organized at Seattle, New Orleans and the Quad-cities compris-

ing Davenport, Iowa, Rock Island, Moline and East Moline, Ill.

Tentative code on large pipe for hydraulic purposes will be prepared soon. A master chart of welding processes and a set of definitions are in preparation. A revision of the standard qualification procedure is imminent.

Standard Methods for Mechanical Testing of Welds is to be issued in the near future. New committees have been authorized on nondestructive tests, code for welding of high-alloy engineering structures, code for nickel-alloy structures, grouping of materials according to weldability, code for machinery, and rules for field-welding of storage tanks.

Other committees are working with other organizations to correlate standards of many types. These include 11 working with American Standards association, two with American Society for Testing Materials, others with five groups.

Society's building code has been adopted by more than 200 cities, it was reported.

The Miller medal, established by the American Welding society to commemorate the contributions of Samuel Wylie Miller to the science and art of welding, was awarded to C. J. Holslag, president, general manager and chief engineer, Electric Arc Cutting & Welding Co., Newark, N. J., for his pioneering in development of alternating-current arc welding and covered electrodes.

The Lincoln gold medal was presented to G. O. Hoglund, Aluminum Co. of America, New Kensington, Pa., and G. S. Bernard Jr., Aluminum Cooking Utensil Co., also of New Kensington, for a paper, "The Effect of Current, Pressure and Time on the Shear Strength and Structure of Spot Welds in the Aluminum Alloys," published in the Nov., 1938, issue of *The Welding Journal*.

George Terry Horton, Chicago Bridge & Iron Co., Chicago, was elected president to succeed Mr. Boardman. Turner C. Smith, General Petroleum Corp. of California, Pacific coast subsidiary of Socony-Vacuum Oil Co., was named first vice president.

Second vice president is Leon S. Moisseiff, consulting engineer. District vice presidents include A. J. Moses, Combustion Engineering Co., Chattanooga, Tenn.; W. F. Hess, Rensselaer Polytechnic institute, Troy, N. Y.; L. W. Delhi, Western Pipe & Steel Co., San Francisco; L. C. Bibber, Carnegie-Illinois Steel Corp., Pittsburgh; K. L. Hansen, Harnischfeger Corp., Milwaukee.

Directors-at-large include E. V. David, Air Reduction Sales Co., New York; Col. G. F. Jenks, United States army, Washington; John D. Gordon, Taylor Winfield Corp., Warren, O.; and H. S. Smith, Linde Air Products Co., New York.

■ **Reports of technical sessions conducted during the National Metal congress will be found on pages 52, 53, 54, 55, 62, 63, 64, 66, 67, 68, 69, 72 and 73.**

Romance in Steel

■ **As a feature at one of the welding exhibits, National Metal show in Chicago last week, Ethel Lobdell, Miss Chicago 1939, demonstrated this novel method of mending a broken heart**

◆

Metal Treating Institute Meets; Elects Officers

■ A. M. Cox, president, Pittsburgh Commercial Heat Treating Co., Pittsburgh, was elected president of the Metal Treating institute at the organization's annual meeting in Chicago, Oct. 22, just prior to the opening of the twenty-first National Metal congress and exposition. Mr. Cox succeeded O. T. Muehlemeyer, president, O. T. Muehlemeyer, Rockford, Ill.

C. I. Wesley, president, Wesley Steel Treating Co., Milwaukee, was named vice president. L. A. Lindberg, vice president, Lindberg Steel Treating Co., 218 North Laflin street, Chicago, was re-elected secretary-treasurer.

Elected directors for the coming year were: W. F. Hamilton, president, Accurate Steel Treating Co., Chicago; C. G. Heilman, president, Commonwealth Heat Treating Co., Detroit; Retiring President Muehlemeyer; and C. W. Derhammer, president, Lakeside Steel Improvement Co., Cleveland.

REPORTS INDUSTRIAL GAS SALES INCREASING

Industrial gas sales in the Chicago area now are considerably in excess of those to domestic users, it was revealed by F. X. Mettenet, vice president, Peoples Gas, Light & Coke Co., Chicago, at a breakfast for the industrial gas section, American Gas association, Palmer House, Chicago, Oct. 24.

Manufacturers To Honor Inventors, Researchers

■ Dr. Karl T. Compton, president, Massachusetts Institute of Technology, has been named chairman of the National Association of Manufacturers' committee to select America's most outstanding "Modern Pioneers," inventors who have contributed most to our standard of living (STEEL, July 24, p. 32). Other committee members: Forest R. Moulton, American Association for Advancement of Science; George B. Pegram, Columbia university; John T. Tate, University of Minnesota; Edward R. Weidlein, Mellon institute; Frank C. Whitmore, Pennsylvania State college.

The manufacturers' association has asked industrial groups to submit nominations before Dec. 1. Those finally selected by the committee will be honored Feb. 27 at a celebration in New York, commemorating the 150th anniversary of the founding of the American patent system.

Higher Costs, Static Selling Prices; Profits Still Difficult Problem

■ "ONE of the great problems confronting steel companies today is to forecast with any degree of accuracy the immediate business future," says E. J. Kulas, president, Otis Steel Co., Cleveland in a public statement. "Part of the difficulty is due to the fact that the answer to the problem involves factors entirely beyond our control.

"I am among those who see no justification in believing that the present rate of steel purchasing will continue if the international situation remains as it is today. All steel companies have a substantial backlog of orders and the emphasis is no longer on selling but on the delivery of the steel already sold.

"The possibilities of increases in the backlog at the rate at which orders were booked in September is in my opinion remote and I even venture the opinion that present backlogs will be greatly reduced before Jan. 1.

Raw Materials Higher

"The price situation presents still another great difficulty for the steel manufacturer. On the one hand he sees raw materials of all sorts increasing steadily in price, and on the other, unmistakable pressure being brought to bear from high places to maintain steel prices at their present levels.

"If the present sudden influx of business decreases as rapidly as I think it may, we will find our costs greatly affected by not only the sharply increased material costs, but lower absorption of overhead because of sharply reduced volume.

"Some of the items which go into steel costs seem in themselves insignificant, as for example, the recently announced increase in price of fuel oil. One cent a gallon does not seem like much, but with us the total annual cost of this increase at our present rate of production is about $300,000 a year.

Future Uncertain

"Since May 1939 open-hearth scrap has increased $6.60 a ton which represents an additional item of cost to this company at its present rate of operation of $145,000 per month. Blast furnace scrap increased $4 a ton or another $60,000 per month. These price increases are typical of what is happening to virtually every commodity which we purchase.

"It is obvious therefore that operating without a loss at present resale prices with the replacing of inventories of raw materials at present marked-up prices present a very real and difficult problem.

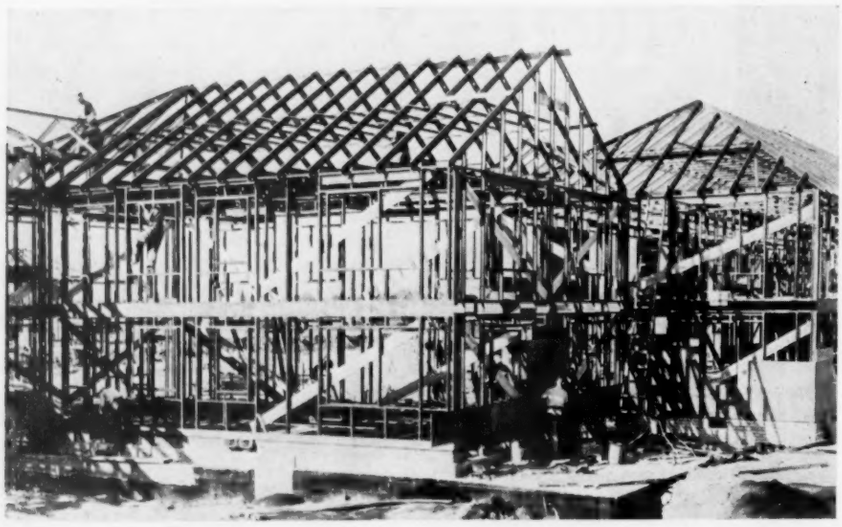
"It has been said that it is either a feast or a famine in the steel industry. We have been through a famine so long that even a thin slice or a few crumbs to the steel industry would seem like a banquet.

"Obviously there are factors which may bring about an entirely different picture than that which I have drawn. Foremost of these factors and among the most important, is the establishing of a steel resale price in step with the increased material costs going into the making of steel, and second, a changed international situation to which I have previously referred.

"If the embargo is lifted, there is every possibility that export business will add largely to our total business and that operations will be maintained at a reasonably high level. A prolonged period of high operations would inevitably lead to more employment.

"There can be no doubt but that a lifting of the embargo would result in the business upturn which I have just described. Whether or not the lifting of the embargo would be beneficial to American industry in the long run is a question about which there is a wide difference of opinion. If it would result in bringing this country even a single step nearer the possibility of being drawn into the war, the embargo lifting would be a great mistake. While war results in increased volume, the aftermath of war as we have seen to our sorrow, brings ruin and bankruptcy in the end."

Six Days To Erect Apartment's Steel Framing



■ Six days after placing steel floor joists on foundations, the entire steel framing for this 24-suite apartment building was in place and sheathing started. Building is one of 16 being erected for a housing project of the Ford foundation in Dearborn, Mich. Stran-Steel framing, cut to size, was supplied by the Stran-Steel division of Great Lakes Steel Corp., Detroit

Advises Larger Scrap Stocks for Steel Mills

■ Sharp increases of iron and steel scrap prices, such as occurred in September, could be avoided if steel mills and foundries would build up adequate reserves to cushion periods of peak demand, according to E. C. Barringer, executive secretary, Institute of Scrap Iron & Steel Inc., New York.

"Steel mills and foundries are currently consuming scrap at the record rate of about 3,800,000 tons a month," said Mr. Barringer addressing scrap dealers at Albany, N. Y. "During the first half of this year, when scrap averaged about $15 a ton, a 90-day inventory could have been built up for $90,000,000, taking into consideration that only one-half of all scrap requirements must be purchased in the open market.

"For a $5,000,000,000 industry this would be inexpensive insurance against sharp bulges in price which are inevitable when consumers make a concerted demand on supplies. Scrap dealers would welcome more stable markets and consumers would level off peaks in their costs.

"If the recent rise in the price of scrap provides steel mills with a reason for advancing quotations on their products, the temporary dislocation will be a small price to pay for putting the steel industry on a more remunerative basis."

Three Months' Profit for Steelmakers

Double Second Quarter's

■ TWELVE steel producers, representing 27,754,040 tons ingot capacity, or 39 per cent of the industry's total, reported aggregate net earnings of $12,907,537 for the three months ended Sept. 30.

Third quarter profit compares with $6,580,261 earned by the identical companies in the second quarter, and $4,378,211 in the third quarter last year.

Nine months' earnings for 11 companies totaled $23,440,543. In the first nine months of 1938, an aggregate deficit of $13,867,736 was reported.

United States Steel Corp. and several other major producers have not yet reported for the September quarter.

BETHLEHEM'S NEW ORDERS EXCEEDING PRODUCTION

Bethlehem Steel Corp. earned $5,377,470 in the third quarter, compared with $3,822,927 in the second period, and $446,866 in third quarter, 1938. Third quarter income is equivalent to $1.10 a common share after preferred dividends. Directors declared a $1 dividend on common payable Dec. 1 to record Nov. 10. Regular preferred dividends will be paid Jan. 2, to record Dec. 8.

Steel production for third quarter averaged 70.1 per cent of capacity, compared with 60.4 per cent in second quarter, and 46.4 during the third quarter of 1938. Current steel production is approximately 95 per cent, according to Eugene G. Grace, president.

Mr. Grace said he could see no necessity for important increases in steel prices, particularly now with low-priced orders being worked off. Certain spots in the general steel price structure may need adjustment, but he did not see anything to justify sweeping, sharp upward revisions.

Mr. Grace emphasized particularly he did not wish to see, nor to be a party to, anything suggesting profiteering. Bethlehem he said, is adhering to a "fair price and a fair profit" policy and that this is applying to foreign, as well as domestic business.

He asserted that while Bethlehem was frequently alluded to as a "war baby," adequately equipped to turn out munitions, the company, even selfishly from the standpoint of profits, would much prefer a condition of peace throughout the world.

Bethlehem is not furnishing munitions for any, except the United States government, he said and added he wished there was not the necessity for even that.

Some over-buying of steel in recent weeks was likely, he thought. Stocks of consumers and distributors were low. Buyers had been specifying on a strictly hand-to-mouth basis for many months and when war broke out in Europe, there was a rush to cover. In the scramble, he indicated, there was probably some speculative buying.

Railroad demand has been an important factor in the sharp spurt in company's production from around 60 per cent to virtual capacity.

Unfilled bookings of $263,857,017 on Sept. 30 were the heaviest in peacetime history, being exceeded only in 1918. This was true with respect to both steel orders and ship work.

Increase in Exports

He noted a sharp increase in export business. This business, Mr. Grace said, falls in two categories, one representing business from neutral countries, which have had normal sources of supply cut off by the war, and the other representing orders for commercial steels from the belligerents.

Despite the company's present high rate of production, volume of new orders continues in excess of output. Mr. Grace said he had expected sharp tapering in new orders, but such has not been the case.

Bethlehem's employment in the third quarter increased to 96,947, with wages for the period totaling approximately $40,000,000. In the preceeding quarter, 89,787 men were employed, with compensation

Steel Producers' Financial Statements Summarized

	Third Quarter, 1939	Second Quarter, 1939	Third Quarter, 1938	Nine Months, 1939	Nine Months, 1938	Rated Ingot Capacity
Bethlehem Steel Corp.	$5,377,470	$3,822,927	$446,866	$11,609,452	$1,592,079	10,042,000
Republic Steel Corp.	2,815,339	550,412	2,387,556*	3,898,650	8,306,437*	6,500,000
Jones & Laughlin Steel Corp.	1,129,001	471,287*	1,958,810*	281,189	4,882,838*	3,660,000
Youngstown Sheet & Tube Co.	765,036	329,086	727,546*	1,311,259	748,042*	3,120,000
Wheeling Steel Corp.	1,639,647	939,995	606,908	3,408,303	549,015*	1,750,000
Colorado Fuel & Iron Corp.§	231,282	699,594	143,752*	1,094,506	924,176*	885,040
Allegheny Ludlum Steel Corp.**	327,772	147,740	352,180*	682,094	†	537,000
Sharon Steel Corp.	59,484*	148,157*	19,065*	200,028*	362,980*	500,000
Continental Steel Corp.	198,138	253,128	192,360	730,445	403,660	325,000
Keystone Steel & Wire Co.	273,922	380,738	83,224	972,269	574,848	250,000
Wickwire Spencer Steel Co.	52,661*	149,100*	137,643*	360,514*	587,481*	150,000
Rustless Iron & Steel Corp.	262,045	225,185	18,933	695,008	77,354*	‡35,000
Totals	$12,907,537	$6,580,261	$4,378,211*	$23,440,543	$13,867,736*	27,754,040
FINISHING CAPACITY ONLY:						
Superior Steel Corp.	29,303	54,043*	49,994*	31,472*	312,453*	.....
Acme Steel Co.	443,184	259,969	110,007	1,042,825	173,146	.....
PIG IRON CAPACITY ONLY:						
Interlake Iron Corp.	311,385*	442,574*	452,018*	1,104,637*	718,339*	1,215,000

*Loss. §Fiscal year ends June 30. **Fiscal year ends Oct. 15. †Merged Aug. 10, 1938; no earlier reports available. ‡Stainless steel. Total for nine months, 1939, does not include Allegheny Ludlum Steel Corp.

amounting to $36,000,000. Average weekly schedule in the third quarter was 34.5 hours, against 34.02 in the second. Largest number of men ever on the company's payroll was slightly in excess of 100,000.

No important expansion is under contemplation. So far this year the company has spent about $7,000,000, will probably spend $3,000,000 more before the year is over, with still another $2,000,000 to be expended later under the current program.

Otis Steel Co.

Third quarter net loss reported by Otis Steel Co., Cleveland, amounted to $184,317, against a deficit of $431,766 in the preceding three months, and a loss of $465,596 in the September, 1938 period. Indicated nine months net loss, as tabulated from the company's quarterly reports, totaled $435,957, compared with a deficit of $1,283,076 in the corresponding period a year ago.

Granite City Steel Co.

Granite City Steel Co., Granite City, Ill., reports third quarter net profit of $53,953, equal to 14 cents a share, compared to $18,559 or 5 cents a share for corresponding 1938 period. Second quarter net profit was $21,610, equal to 6 cents a share. Nine months net profit totaled $88,999, equal to 23 cents per share, compared with $253,174 net loss for same 1938 period.

Wheeling Steel Corp.

Wheeling Steel Corp., Wheeling, W. Va., reports third quarter net profit of $1,639,647, equal to $2.05 per common share, compared to $939,995 or 81 cents a share net income for second quarter. Net profit in third quarter of 1938 was $606,908, or 22 cents a share. Nine months net profit this year is $3,408,303, equal to $3.48 per share on common; for corresponding 1938 period company reported net loss of $549,105.

Superior Steel Corp.

Superior Steel Corp., Pittsburgh, reports third quarter net profit of $29,303, equal to 26 cents per share on capital stock, compared with $49,994 net loss for corresponding 1938 period. Second quarter net loss, $54,043. Nine months deficit totaled $31,472, against $312,453 net loss for same 1938 period.

M. A. Hanna Co.

M. A. Hanna Co., Cleveland, reports third quarter net profit of $581,506, equal to 41 cents per common share compared with $169,431 net income for the 1938 period. Second quarter net profit, $315,104. Nine months net profit was $1,068,717 or 57 cents a share; for same 1938 period net profit, $390,032.

Consumers Nine Months Net Profits Up 121.2 Per Cent

■ Net profit of fifty-eight companies among equipment manufacturers, suppliers and other leading iron and steel consumers during the first nine months of this year totaled $77,948,088, or 121.2 per cent above $35,228,247 reported for the corresponding 1938 period. Only six of the group reported a third quarter net loss, whereas 24 had a deficit for the same 1938 period. STEEL's tabulation Oct. 23, p. 23 included 19 companies, while the following lists 39. All figures are net earnings except where asterisk denotes loss:

	Third Quarter		Nine Months	
	1939	1938	1939	1938
Aetna Ball Bearing Mfg. Co., Chicago	50,031	24,407	163,214	34,493
Allis-Chalmers Mfg. Co., Milwaukee	943,450	505,160	2,643,873	3,384,219
Atlas Tack Corp., Fairhaven, Mass.	29,626	22,656	76,010	19,629
Bendix Aviation Corp., South Bend, Ind.	918,873	89,794	3,078,083	406,205*
Bliss & Laughlin Inc., Harvey, Ill.	137,861	14,551	391,376	22,414*
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.	27,694*	20,898*	36,265*	167,158*
Bridgeport Machine Co., Wichita, Kans.	35,406	21,606	172,089*	15,076
Briggs & Stratton Corp., Milwaukee	164,024	112,699	716,402	509,643
Budd Wheel Co., Philadelphia	33,761	223,021*	310,035	588,245*
E. G. Budd Mfg. Co., Philadelphia	401,854*	546,825*	126,920*	1,577,027*
Byron Jackson Co., Huntington Park, Calif.	121,330	62,143	340,556	481,306
Campbell, Wyant & Cannon Fdry. Co., Muskegon, Mich.	66,362	89,608*	27,404	258,079*
Central Foundry Co., New York	29,097	91,338*	40,233	270,405*
Chicago Railway Equipment Co., Chicago	29,829	6,600*	42,218	63,757*
Clark Equipment Co., Buchanan, Mich.	203,444	35,867	703,635	187,125
Diamond T Motor Car Co., Chicago	54,919	16,711	153,847	4,878
Doehler Die Casting Co., Toledo, O.	135,572	23,237	398,700	132,966
Dresser Mfg. Co., Bradford, Pa.	345,747	101,525	427,130	28,456
Easy Washing Mach. Corp., Syracuse, N. Y.	64,819	60,988*	208,061	319,405*
Electrolux Corp., New York	294,389	301,435	1,113,000	1,513,140
Gardner-Denver Co., Quincy, Ill.	213,940	166,772	663,463	290,954
Gabriel Co., Cleveland	12,260	7,277*	19,726	27,121*
General Refractories Co., Philadelphia	287,411	35,223*	421,097	31,450
U. S. Hoffman Machinery Corp., New York	500	57,326*	90,400	184,051*
Johns-Manville Corp., New York	1,472,255	882,366	2,675,999	857,469
Kingston Products Corp., Kokomo, Ind.	65,525	3,885*	111,755	169,576*
Master Electric Co., Dayton, O.	180,230	72,317	420,698	212,111
Min'polis-Honeywell Regulator Co., Min'polis	779,555	576,734	1,134,622	719,641
Motor Products Corp., Detroit	405,280*	334,061*	321,869*	250,839*
McKay Machine Co., Youngstown, O.	11,407	19,106	90,618	90,740
New York Air Brake Co., New York	157,329	51,286*	373,620	271,558*
Noblitt Sparks Indust. Inc., Columbus, Ind.	179,611	140,825	512,008	46,483
North American Aviation Corp., Inglewood, Calif.	2,267,935	424,316	5,049,617	1,014,491
Otis Elevator Co., New York	$841,521	$481,623	$2,419,678	$1,616,840
Pittsburgh Screw & Bolt Corp., Pittsburgh	165,162	103,366*	115,686	330,380*
Seagrave Corp., Columbus, O.	26,660*	21,984*	6,774*	28,926*
Signode Steel Strapping Co., Chicago	130,382	51,802	508,739	59,704
Thompson Products Inc., Cleveland	292,618	165,454	988,673	277,552
Truscon Steel Co., Youngstown, O.	181,832	280,993*	345,781	880,268*

LABOR

TEN PER CENT INCREASE IN STEEL EMPLOYMENT

■ STEEL EMPLOYMENT increased nearly 10 per cent in September, with an average of 502,000 at work, highest figure in almost two years, American Iron and Steel institute reported last week. August employment averaged 458,000, while employment in September a year ago averaged 431,000.

September payrolls totaled $69,735,000, largest since autumn of 1937, and one-third greater than September a year ago. The increase over August was nearly $2,000,000, despite fewer working days.

Wage earning employes averaged 84.7 cents per hour, no change from August, but higher than 83 cents in September, 1938. An average of 35 hours per week was worked, compared with 36.2 hours in August, and 30 hours in September a year ago.

SWOC DEMANDS $5 PER DAY AT BETHLEHEM PLANTS

SWOC committees last week called at various Bethlehem Steel Co. plants demanding a $5 minimum daily wage immediately. No official comment was made.

Recent efforts by the department of labor to establish a minimum rate of 62½ cents per hour in certain districts, under the Walsh-Healey act, were nullified by decision of the federal district court of appeals which ruled Secretary Perkins had exceeded her authority.

BAR IRON WAGES STEADY

Wages of employes in bar iron and puddling mills will remain unchanged during November, according to the monthly settlement between Western Bar Iron association and Amalgamated Association of Iron, Steel and Tin Workers. The card rate announced for November on puddling, bar and 12-inch mills is 2.15c; and on guide and 10-inch mills, 2.25c.

Machine Exports Up 14 Per Cent

■ UNITED STATES' exports of industrial machinery in September totaled $23,255,346, a gain of 14 per cent over September, 1938, shipments of $20,355,131, according to the machinery division, department of commerce. Advances were recorded in all major groups except in construction and conveying, mining and pumping equipment.

Textile machinery shipments gained 142 per cent over September, 1938, power generating machinery 22 per cent, power-driven metalworking machinery 17 per cent and miscellaneous 29 per cent.

Power-driven metalworking machinery exports represented 41 per cent of total industrial equipment shipments, valued at $9,539,355, compared with $8,144,947 in September last year. Increases were noted in practically all classes, particularly in lathes, milling machines, drilling machines, vertical boring mills, automatic screw machines and internal grinders. Declines were noted in sheet and plateworking equipment and forging machinery. Rolling mill equipment advanced to $1,038,370 from $861,779 in September, 1938. Metalworking machinery, other than power-driven, gained 64 per cent over September, 1938, to $410,240.

Construction and conveying equipment shipments declined 3 per cent from last year, September total being $1,767,562 against $1,813,839. Mining, well and pumping equipment showed a decline of 8 per cent, largely due to smaller exports of petroleum handling machinery.

13.8 Per Cent Gain in Carloadings Forecast

■ Freight car requirements for fourth quarter will be 13.8 per cent higher than in fourth quarter last year, according to estimates by the regional shippers' advisory boards. For 29 leading commodities, 5,784,468 cars will be required, compared with actual requirements of 5,083,573 in the last three months of 1938.

Heaviest increase will be for ores and concentrates, which will require 331,058 cars, against 208,099 in the 1938 final period, a rise of 59.1 per cent. Iron and steel requirements are up 29 per cent, from 300,827 to 388,127. Coal and coke requirements are 15.8 per cent higher, 2,041,924 for the current quarter, against 1,762,989 in the comparable period last year. Machinery and boilers will take 24,419 cars, compared with 21,314, a 14.6 per cent increase.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Oct. 28	Change	Same week 1938	Same week 1937
Pittsburgh	91	+ 2	42	41
Chicago	90	+ 1	46.5	44
Eastern Pa.	78	+ 6	34	43
Youngstown	92	— 2	61	54
Wheeling	93	None	59	62
Cleveland	90	None	74	59
Buffalo	93	+ 7	49	51
Birmingham	94	+ 4	57	64
New England	90	—10	55	25
Cincinnati	88	None	70	70
St. Louis	80	+ 3	43	51.6
Detroit	95	— 1	82	90
Average	92	+ 1	54.5	51

PRODUCTION

■ STEELWORKS operations last week rose 1 point to 92 per cent, highest since week of Aug. 17, 1929. On enlarged capacity this represents a much greater tonnage. Gains were made in six districts, declines in three and no change in the remaining three. A year ago the rate was 54.5 per cent; two years ago 51 per cent.

Youngstown, O. — Declined 2 points to 92 per cent as three producers took off one open hearth each for repairs, leaving three bessemers and 70 open hearths in production. Outlook this week is for small increase. Carnegie-Illinois Steel Corp. plans to start twelfth open hearth at its Farrell plant in about a week.

Youngstown Sheet & Tube Co. is installing a Semet-Solvay light oil stripping still at its Brier Hill coke plant for continuous removal of crude residue from the light oil.

Chicago—Advanced 1 point to 90 per cent, following small adjustments. Two mills are at 100 per cent and two above theoretical capacity.

Detroit—Down 1 point to 95 per cent as one open hearth lost a day for repairs. Ford Motor Co. continues eight of its nine furnaces and Great Lakes is near capacity.

Birmingham, Ala.—Up 4 points to 94 per cent as Republic Steel Corp. lighted its eighth open hearth, making 22 active in this district.

St. Louis—Gain of 3 points to 80 per cent resulted from addition of one open hearth.

Cincinnati—Steady at 88 per cent, close to practical capacity.

Pittsburgh—Increased 2 points to 91 per cent. This week the rate is expected to rise slightly.

Wheeling—Unchanged at 93 per cent for the fourth consecutive week.

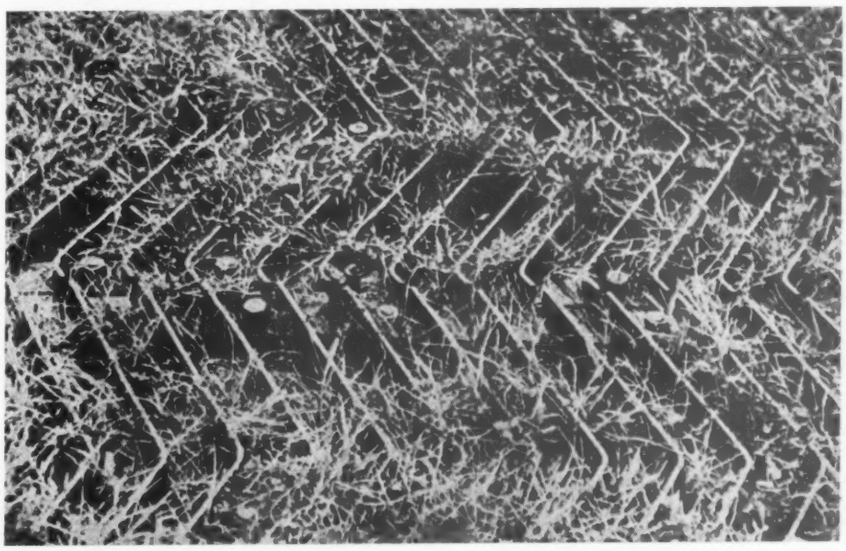
Cleveland—Held at 90 per cent for third week.

Buffalo—Rose 7 points to 93 per cent. Further increase depends on completion of furnace repairs.

New England—Dropped 10 points to 90 per cent. This week will start with full production but one open hearth is scheduled to go out for repairs about Nov. 3.

Central eastern seaboard—Up 6 points to 78, with indication for additional capacity being engaged soon.

Steel and Grass Camouflage British Air Base



■ **Photographs from France reveal new uses of steel in modern warfare. Here is a closeup of a network of rods laid over a secret British air base "somewhere in northern France." The grill prevents airplane wheels from bogging down in a wet field, and the grass forms an effective camouflage. Wide World photo, passed by British censor, flown to New York by clipper**

MEN OF INDUSTRY

■ CHESTER W. RUTH, formerly assistant director of advertising, Republic Steel Corp., Cleveland, has been appointed director of advertising, succeeding Stanley A. Knisely who recently resigned to become executive vice president, Associated Business Papers, New York. Harold H. Oldham, heretofore manager of the production and copy department, has been made assistant director of advertising. Mr. Ruth began his active association with steel advertising in 1920 with a Canton, O., advertising agency. Six years later he joined the advertising department of United Alloy Steel Co., which was consolidated with Central Steel Co. to become Central Alloy Steel Corp. In 1930 when the company became a unit of Republic, Mr. Ruth was appointed assistant advertising manager, and in 1936 was promoted to assistant director of advertising.

♦

C. V. Lally has resigned as manager of seamless steel tube sales, Pittsburgh Steel Co., Pittsburgh.

♦

H. J. Clark, foreign erection manager, Chicago Bridge & Iron Co., Chicago, sailed Oct. 20 for Venezuela.

♦

Henry F. Vogt, vice president, Cutler-Hammer Inc., Milwaukee, has been elected a director, Safway Steel Scaffolds Co., Milwaukee.

♦

Charles E. Mueller, president, American Hollow Boring Co., Erie, Pa., has been elected chairman of Erie's community chest campaign.

♦

A. E. Shelton has resigned as chief purchasing agent, Lockheed Aircraft Corp., Burbank, Calif., to become president and director of Menasco Mfg. Co., Los Angeles.

♦

C. T. Goodwill, since 1930 associated with the sales department of Bopp Steel Corp., Dearborn, Mich., has been named assistant to the president.

♦

James S. Murray, South Hills, Pittsburgh, has been appointed representative in the Pittsburgh territory for Kelly Reamer Co., Cleveland.

♦

Robert H. Clarke, formerly an official of Otis Steel Co., Midland Steel Products Co., and Apex Electrical Mfg. Co., Cleveland, has joined the

Chester W. Ruth

American Coach & Body Co., Cleveland, in an executive and advisory capacity.

♦

Frank H. Adams, vice president and general manager, Surface Combustion Corp., Toledo, O., has been elected president, Association of Gas Appliance and Equipment manufacturers.

♦

W. M. Driver, assistant secretary, Bethlehem Steel Co., Bethlehem, Pa., sailed Oct. 20 for Venezuela. Herbert Merriweather, also associated with Bethlehem, sailed for the same destination.

♦

Ralph K. Clifford, since 1937, works manager, Kokomo division, Continental Steel Corp., Kokomo, Ind., has been named vice president in charge of operations for the company's plants at Kokomo, Indianapolis and Canton, O. Mr. Clifford began his career in 1907 with the Kokomo Steel & Wire Co., which in 1927 became a part of Continental.

Ralph K. Clifford

He has been an active member of the Wire association, and is past president of that organization. He is a member, executive committee of the open-hearth committee, American Institute of Mining and Metallurgical Engineers.

♦

J. M. Floyd, a vice president, A. O. Smith Corp., Milwaukee, has been elected a director, to fill the vacancy caused by the recent resignation of Carl C. Joys Jr., who also was director of sales.

♦

E. G. Parsons, associated with William Schollhorn Co., New Haven, Conn., for several years, has been made district sales manager in the New England and metropolitan New York areas.

♦

Joseph Smithers has been appointed district manager of sales in the Minneapolis-St. Paul territory for Granite City Steel Co., Granite City, Ill. Mr. Smithers has his office at 1310 Northwestern Bank building, Minneapolis.

♦

George J. Chapman and Carl M. Snyder have been named assistant managers, appliance department, General Electric Co., Schenectady, N. Y., in line with the recent consolidation of the company's appliance operations at Bridgeport, Conn.

♦

J. D. Long has been named acting manager, Pittsburgh plant, Federated Metals division of American Smelting & Refining Co., succeeding I. A. Simon, resigned. Associated with the company 15 years, Mr. Long formerly was in charge of sales.

♦

Warren A. Silliman has been appointed metallurgist, Cleveland Tractor Co., Cleveland, succeeding Gordon T. Williams, who has joined Deere & Co., Moline, Ill., in a metallurgical capacity. Mr. Silliman has been with Cleveland Tractor six years.

♦

C. L. Peterson has been named advertising manager, Cleveland Crane & Engineering Co., Wickliffe, O., succeeding the late John R. Booher. Mr. Peterson has been with the company three and a half years, following service with several electrical equipment firms.

♦

D. B. McCoy, manager of the Toronto, Ont., office of Steel Co. of Canada Ltd., since 1922, has been appointed sales manager, with headquarters in Hamilton, Ont. He began his career in the steel industry in 1907 when he joined the Belleville Rolling Mills, and when this company was absorbed by Steel Co. of Canada in 1910, Mr. McCoy took over the northern Ontario and Ottawa

valley territory. In 1919 he took charge of the Vancouver sales office. Charles S. Phoenix, salesman in the Toronto office since 1922, in charge of the pig iron division, succeeds Mr. McCoy as manager.

♦

Edward H. Grob, formerly assistant superintendent of Hubbard & Co.'s Oakland, Calif., plant has been named superintendent, succeeding the late Charles E. Braun. Frank R. Pinson, associated with the company since 1925, has become assistant superintendent of the Oakland plant.

♦

Dr. Charles M. A. Stine, vice president in charge of research, E. I. du Pont de Nemours & Co., Wilmington, Del., has been awarded the Perkin medal of the Society of Chemical Industry for 1940, for "valuable work in applied chemistry." The medal will be presented to Dr. Stine Jan. 12, at a meeting of the Chemists' club, in New York.

♦

D. J. Fox, heretofore vice president, Fretz-Moon Tube Co., Butler, Pa., has resigned to become assistant treasurer, National Supply Co. A. R. Tayerle has been named secretary and treasurer of Fretz-Moon. He formerly was with Republic Steel Corp., Cleveland, as secretary to the vice president in charge of finance .

♦

John W. Young has been elected president and general manager, Hayes Body Corp., Grand Rapids, Mich., succeeding the late Edward J. Connolly. Mr. Young formerly was executive vice president of Breeze Corporations Inc., Newark, N. J., and president of Federal Laboratories Inc., Pittsburgh.

♦

A. W. Wild has been named manager, aircraft division, Continental Motors Corp., New York. Other changes in the division; D. H. Hollowell is now sales manager, replacing W. R. Angell Jr., who recently resigned as assistant secretary and sales manager; J. B. Fornaser has been made engineer. R. D. Hicks continues as service manager, with W. B. Powell, his assistant.

♦

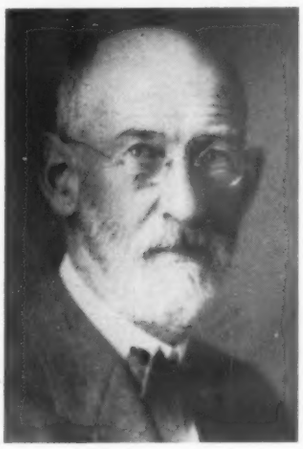
Dr. Louis Davidson Ricketts, consulting engineer, was elected the James Douglas gold medallist for 1940 at a meeting of the board of directors, American Institute of Mining and Metallurgical Engineers, in New York, Oct. 19, for his achievements in copper metallurgy. The medal will be presented to Dr. Ricketts at the annual meeting of the institute in February, 1940.

♦

Carnegie-Illinois Steel Corp., Chicago, has announced the following appointments at its Gary, Ind., works: L. M. Kirk, superintendent of mold preparation, has been made superintendent of No. 2 open hearth; George McMorran becomes assistant superintendent of No. 2 open hearth, and I. G. Brown becomes assistant superintendent of No. 4 open hearth, succeeding Mr. McMorran. Mr. Brown has been with Gary works since 1938 as a metallurgist.

DIED:

■ WILLIAM ANGELL VIALL, 78, vice president and secretary, Brown & Sharpe Mfg. Co., Providence, R. I., in Providence, Oct. 24. Active in half a dozen large corporations as well as in philanthropic work, Mr.



William A. Viall

Viall joined Brown & Sharpe in 1890; in 1906 was elected secretary, and several years later, vice president and secretary. Mr. Viall was also president of Brown & Sharpe Co. and Brown & Sharpe of New York Inc., two subsidiary corporations.

♦

H. H. "Jack" Chambers, 47, western sales manager. Caterpillar Tractor Co., in Oakland, Calif., Oct. 21.

♦

Frank E. Adair, 55, the past 23 years purchasing agent, E. W. Bliss Co., Hastings, Mich., in Hastings, Oct. 22.

♦

J. Moore Jones, 85, retired Racine, Wis., manufacturer, who from 1907 to 1923 headed the Racine Tool Machine Co., which he founded, in Racine, Oct. 11.

♦

George B. Hamblin, 63, vice president and former works manager and purchasing agent, Whitin Machine Works, Whitinsville, Mass., in Worcester, Mass., Oct. 20.

♦

George A. Steinle, 74, founder and president, Steinle Machine Co., Madison, Wis., Oct. 11 in that city. A native of Madison, he was associated with the Gisholt Machine Co. before establishing his own firm.

♦

William F. Diesel, 62, Oct. 10. He was president and general manager, Sargent & Greenleaf Inc., lock manufacturer, Rochester, N. Y., and vice president of Sargent & Keating, New York.

♦

Ralph H. Donaldson, 61, Oct. 19, while at work at the Alliance, O., works of American Steel Foundries. He retired temporarily as a plant executive to serve in 1931 as safety-service director for the city of Alliance, and was well known in Ohio industrial circles.

♦

Clement C. Richard, 50, who with his brothers organized Richard Bros. Die Works, Detroit, in 1915, recently in Detroit. He was elected president of the corporation in 1933, which in 1928 had become the principal unit of Allied Products Corp.

♦

Charles E. Braun, 42, superintendent, pole line hardware plant, Hubbard & Co., Oakland, Calif., Oct. 1. Previous to becoming superintendent of the Oakland plant he had been in the operating department of the company's Pittsburgh pole line hardware plant.

♦

Vosburgh Horton, 65, identified with the iron and steel scrap industry many years, recently at his home in New York. He was associated with the former Manhattan Rolling Mill Co., and for 15 years prior to his retirement three years ago, was associated with Henry Shapiro, Wilkes-Barre, Pa.

♦

William Kemp Vanderpoel, 58, since 1926 vice president and executive engineer, Okonite Co., Passaic, N. J., wire and cable manufacturer, at his home in South Orange, N. J., Oct. 21. He was a former official, American Institute of Electrical Engineers, and was a member, Engineers Club of New York.

♦

Edward A. Noll, 72, former president and general manager, National Tool Co., Cleveland, Oct. 18 at his home in Lakewood, O. He organized the company in 1905 and shortly thereafter developed a process for hardening high-speed steel. He organized Nolvex File Co. in 1923 and was head of that firm until 1930.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ PARTIAL list of steel industry representatives called to testify before the temporary national economic committee at its steel hearings this week was announced over the week end.

Included are: B. F. Fairless, United States Steel Corp.; E. G. Grace, Bethlehem Steel Corp., Bethlehem, Pa.; Charles R. Hook, American Rolling Mill Co., Middletown, O.; C. H. Roberts, South Chester Tube Co., Chester, Pa.; O. I. Strickland, Wheeling Steel Corp., Wheeling, W. Va.; E. H. Heald, American Bridge Co. Pittsburgh.

P. A. L. Loretz, Pacific Coast Steel Fabricators' association; J. E. Goble, National Tube Co., Pittsburgh; Frank M. Sellers, A. M. Byers Co., Pittsburgh; Clarence J. Houle, Cohoes Rolling Mill Co., Cohoes, N. Y.; Robert Gregg, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; Ernest T. Weir, National Steel Corp., Pittsburgh.

S. M. Bash; Bethlehem Steel Export Corp., New York; A. R. Pfeltz and Dr. H. A. Baker, American Can Co., New York; H. L. Hughes, United States Steel Corp.

Patrick and Emmett Butler, Butler Bros.; Elton Hoyt II, Pickands Mather & Co.; E. B. Greene, Cleveland-Cliffs Iron Co.; D. M. Humphrey, M. A. Hanna Co.; and Crispin Oglebay, Oglebay, Norton & Co., all of Cleveland.

Commerce department officials have invited John V. W. Reynders, New York consulting engineer, to sit on the committee as an alternate. This procedure is unusual.

Hearings it is believed, will last two to three weeks. Between 30 and 35 witnesses are expected to give testimony to the committee.

Hugh Cox, department of justice, who has been directing the steel study, will have charge of the presentation. He will be assisted by Abe Feller, of the same department, who has been in direct charge of the preparation of the presentation.

Extent and character of competition in the steel industry with special reference to prices will be one subject stressed by the department. Iron ore will be taken up in detail, as will the basing point system.

Up to this time no arrangement has been made whereby the steel industry can tell the committee its own story in its own way. Officials state they have had no request from the industry for such a presentation. It is possible it would be granted if asked.

$2,000,000,000 BUDGET FOR ARMED FORCES EXPECTED

Present indications are combined budget for the fiscal year 1941 for the army and navy will total $2,000,000,000 with about half going to each branch of the service.

Congressmen in touch with this situation through the appropriations committee expect the navy will concentrate in the next fiscal year on additional air and ship bases rather than going beyond the 10-year ship building program launched last year. Practically all shipyards are filled and it is believed new shipyards would have to be constructed before any large number of additional warships could be laid down.

Increased army budget will be necessitated partly by the enlarged man-power which was voted by congress at the last session and which has been added to during the past couple of months by the President. This provides for 210,000 additional men for the army as well as expansion of the national guard and marine corps. Increased personnel will require not only subsistence and clothing but will have to be fitted out with rifles and equipment.

JOHNSON URGES WIDER FACTORY DISTRIBUTION

War department officials continue to study plans for industrial mobilization in case of an emergency. Part of this work deals with the situation of industrial plants, the majority of which are located on the eastern seaboard.

Wider distribution of factories is being urged by Assistant Secretary of War Louis Johnson. Less concentration on the seaboard would be better, both for national defense and for our national economy, he believes.

SIGHT CHANGES IN FOREIGN, DOMESTIC COMMERCE BUREAU

Business experts are making a complete survey of the bureau of foreign and domestic commerce of the department of commerce which it is expected will end in revamping the bureau's activities.

Survey has been under way for several months. Definite plans have not yet been worked out, but bureau's personnel morale is at low ebb. Among current rumors are that even commodity division chiefs will be changed.

District offices of the bureau are located in 26 key cities. One plan under consideration is to broaden the work of these district offices in the 12 cities in which the federal reserve board now has district offices. Activities of these division offices would be increased by the making of reports on business conditions by districts. This information has long been wanted by various government departments and while a part of the information is now supplied by the federal reserve board, more complete information is desired.

ARNOLD REPORTS ON WAGE-HOUR ENFORCEMENT

Assistant Attorney General Thurman Arnold last week reported to the attorney general results of the first year's enforcement of the wage-hour act.

Criminal enforcement of the act was assigned to the antitrust divi-

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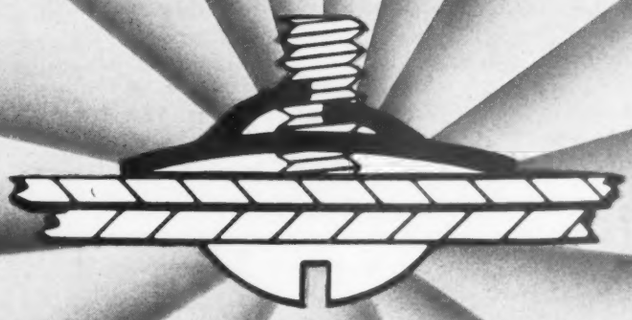

OLD WAY

Speed Nut System (PATENTED)

Replaces Threaded Nuts and Lock Washers

SPEED NUTS are manufactured from high carbon spring steel and heat treated to provide positive holding power for the life of the product. Made for most standard sizes of machine screws, stove bolts, metal screws, metal rivets and plastic studs. Many special shapes and sizes also developed for mass production products. Write for samples today, stating sizes desired and nature of application.

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sion a year ago. Arnold said the ten members of his staff assigned to enforce the act had instituted 46 prosecutions in 13 states and 20 different judicial districts covering the East, the South and the Midwest. It is contended by Arnold that prosecutions have not only stopped unlawful activities but have also improved labor conditions "both in the industries affected and in the areas involved."

In the initial stages of its program the justice unit assigned to this work "sought to secure effective enforcement both by wide geographic distributions of cases and by prosecutions calculated to test every section of the act." The most frequent type of violation, Mr. Arnold said, involved the failure to pay both the minimum wage and overtime, "and endeavoring to conceal this fact either by failing to keep the records required by the act or by falsifying such records."

ASKS SENATE APPROVAL OF TRADE AGREEMENTS

Representative Coffee, Nebraska, has introduced a bill providing no foreign trade agreement shall become effective until "it is concluded by and with the advice and consent of the senate as in the case of treaties."

Bill has been referred to the house committee on ways and means.

There has been much criticism on Capitol Hill for the last two or three years of the foreign trade agreements which the administration is making and this bill is just one evidence of the congressional feeling on the subject.

BELGIUM MAY IMPORT AMERICAN PIG IRON

Because of the difficulty of obtaining adequate supplies of iron ore under war conditions, Belgium's steel industry may shortly be in the market for American pig iron, according to American Commercial Attache K. L. Rankin, Brussels.

Great bulk of iron ore used by Belgian steel plants comes from basins in eastern France. At present all the ore in this region is allocated and other countries will find it difficult to obtain supplies from the source.

Belgian plants are mainly equipped to produce Thomas steel in order to use the phosphorous ore of eastern France. The needs of France itself and the difficulties of extraction during hostilities in the neighborhood of the mines undoubtedly will cause a sharp reduction in supplies for the Belgian mills.

It is reported in Belgium that the French government has decided to reduce iron ore exports to Belgium to half the usual volume. Consequently, the report said, if the Belgian steel industry is to keep active during the present crisis, pig iron must be purchased abroad, perhaps largely from the United States, as was the case in 1918 before the reconstruction of the local blast furnaces.

NEW ZEALAND TO ESTABLISH STATE-OWNED INDUSTRY

Preliminary steps have been taken in New Zealand to establish a state-owned iron and steel industry, according to a report to department of commerce.

Construction of a plant is to be started immediately at Onekaka, and it is expected production will begin sometime in 1942.

A comprehensive investigation of the dominion's iron ore resources recently concluded by a British engineering organization showed that former estimates of the country's iron ore deposits were greatly exaggerated and that the total amount of ore available, including iron sand ore, amounts to about 18,000,000 long tons. This, however, is considered sufficient to supply New Zealand's needs for more than 70 years. It is estimated total annual production of steel products when the new works gets underway will amount to 104,000 long tons.

As most of New Zealand's iron and steel requirements are now filled by Britain and Australia, the development of a domestic iron and steel industry will have little effect on American trade, the report said.

SAYS NATION'S RAILROADS CAN MEET ANY EMERGENCY

Railroads of this country will continue to furnish adequate transportation regardless of the extent of traffic, it was stated last week by M. J. Gormley, executive assistant, Association of American Railroads. He said the roads are fully able to handle greatly increased volume.

"Tendency of late has been to greatly exaggerate the 'war load'. Unfortunately, carloading figures are not available prior to 1918. However, revenue ton-miles in 1918 showed an increase of but 11.8 per cent over 1916, and 2.8 per cent over 1917.

"It is estimated this increase in freight traffic between 1916 and 1918 was equivalent to approximately 5,000,000 carloads. Assuming the increase was all traffic that had some relation to the war, it may be said that in event of involvement of this country in war, the additional traffic load would not be greater than 12 per cent of the ordinary commercial load. Such an increase would offer no serious problem to the railroads unless cars are utilized for storage."

Association's "embargo" system will prevent any great accumulation of stored cars in time of war outside of strictly government business, Mr. Gormley declared. Plans of the army and navy munitions board, he added, provide that government freight must not be put on cars until it is known it can be readily unloaded at destinations.

New freight cars placed in service or already ordered by the railroads thus far in 1939, according to plans announced at this meeting, probably exceed 46,000. According to Mr. Gormley, it is safe to assume there will be ordered or placed in service this year not less than 60,000 new cars.

"Some months ago," he said, "an estimate was made indicating railroads could handle 25 per cent more business with the serviceable cars and locomotives then available. The fact is that for the week ending Oct. 7, there were loaded 834,694 cars, an approximate increase of 41 per cent in traffic.

"At the same time it was estimated that if all locomotives and cars awaiting repair were put in condition for service, the roads could then handle 50 per cent more existing business. This estimate also was undoubtedly far too low."

ARGENTINE TRADE PACT NEGOTIATIONS GO FORWARD

Harold P. Macgowan of the trade agreements unit of the department of commerce has been sent to Buenos Aires, Argentina, to work with state department representatives in connection with trade agreement consultations between the two countries.

Mr. Macgowan's departure follows conclusion of hearings of the committee for reciprocity information on Argentine and United States trade problems.

Mr. Macgowan will assist United States embassy officials on the technical aspects of Argentine-American trade, particularly as they relate to United States exports and Argentine tariff.

GERMANY WORLD'S LARGEST DIESEL EXPORTER IN 1938

Exports of diesel engines from Germany in 1938 totaled $15,131,390, according to the machinery division of the department of commerce. This volume placed the Reich well ahead of principal competitors, the United Kingdom, United States, Sweden, Switzerland, Denmark, Norway and France.

British exports of diesel engines in 1938 were probably in the neighborhood of $10,000,000, while American shipments were reported at $3,098,000. Production and use of diesels developed much earlier in Europe than in the United States, where it is a comparatively new and fast-growing industry.

AVIATION

CANADIAN EXPANSION SEEN IN "EMPIRE ARSENAL" PLAN

■ HUGE expansion of Canada's aircraft industry is anticipated under current British plans to make the dominion an arsenal for the empire. Program already has been launched by an air mission recently arrived from London. Last week its chief, Lord Riverdale, British steelmaker, disclosed how Canada is to become a reservoir of men and machines for the royal air force.

Bases will be set up to provide complete training for Canadians, as well as advanced instruction for flyers from Australia, New Zealand and England, turning out in all some 25,000 military pilots annually. At the same time heavy orders are to be placed with planemakers for training, fighting and bombing craft. According to authoritative estimates such awards may exceed $100,000,000 in next 18 months.

Still small, despite its rapid growth in recent years, the Canadian aeronautical industry sees great expansion ahead. Nearly every leading firm already is extending its production facilities. National Steel Car Corp. has just announced it will immediately expand its aircraft division at Malton, Ont., more than doubling present capacity. Contract for construction of a plant addition costing nearly $100,000 recently was awarded by Fairchild Aircraft Ltd., Longueuil, Que. Another firm proposes to build at Victoria, B. C., a factory for producing lightplanes of plastics.

Reasonably secure from attack, well-supplied with many vital raw materials, served by growing steel, aluminum and metalworking industries, Canada's airplane builders are in a favorable position to benefit from wartime exigencies. Last year they stepped up output 300 per cent. Thirteen active factories in 1938 reported aggregate production of $6,927,105, compared with but $1,730,724 for eight plants the previous year.

Serious bottlenecks, however, must be surmounted if this rapid increase in production is to continue. Shortage of skilled labor will offer one threat. From its comparatively small supply of skilled workers, Canadian industry already has lost many technical specialists to the army. Since few men can be imported, this problem is to be met to some extent by apprentice schools and other training systems.

May Build Motor Plants

Lacking facilities for producing engines, its aircraft industry must either import units from England and the United States or ship planes without motors. With supplies of engines from the United States cut off by the arms embargo, and those from England severely restricted, it is considered probable engine plants are scheduled for construction.

Greatly hampered by the embargo are several companies dependent upon certain American parts in addition to engines. All firms, however, are freely purchasing semifinished components and production machinery in the United States.

A number of firms now build American-type planes, and it is likely more American aircraft producers will find it convenient to establish branch plants in Canada, regardless of the arms embargo's fate. Should the embargo be maintained, large-scale plant construction by American companies is virtually certain. Such building was urged back in July, 1938, with orders guaranteed, by a British military mission in this country.

Domestic Programs Large

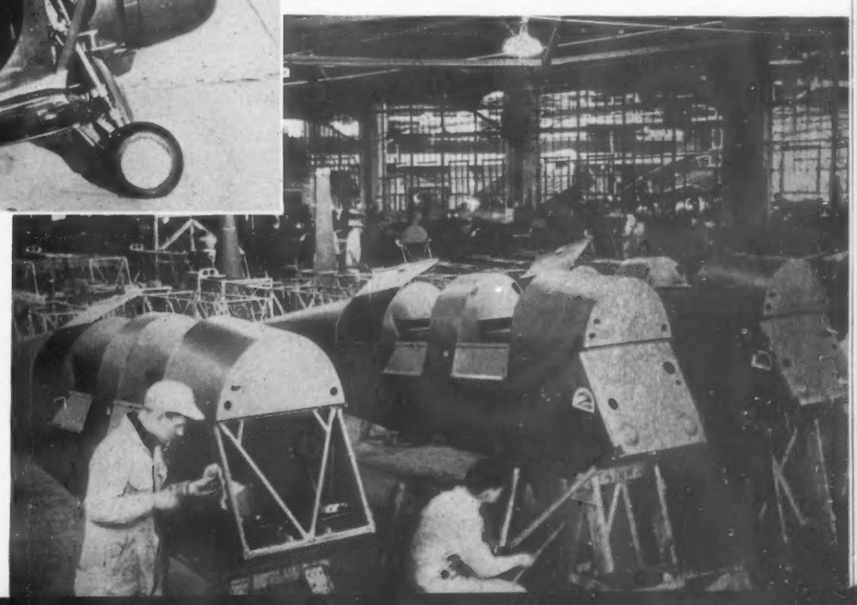
Surge of domestic aircraft plant expansion projects is unabated. Programs now underway or in prospect are estimated to total more than $25,000,000.

Northrop Aircraft Inc. has let contract for constructing at Hawthorne, Calif., an assembly plant to cost $175,000 with equipment. Bids soon will be received by Aeronautical Corp. of America, Cincinnati, on a one-story production unit costing nearly $100,000. Vultee Aircraft division of Aviation Mfg. Corp., Downey, Calif., proposes to build a 25,000-square foot factory addition approximating $40,000.

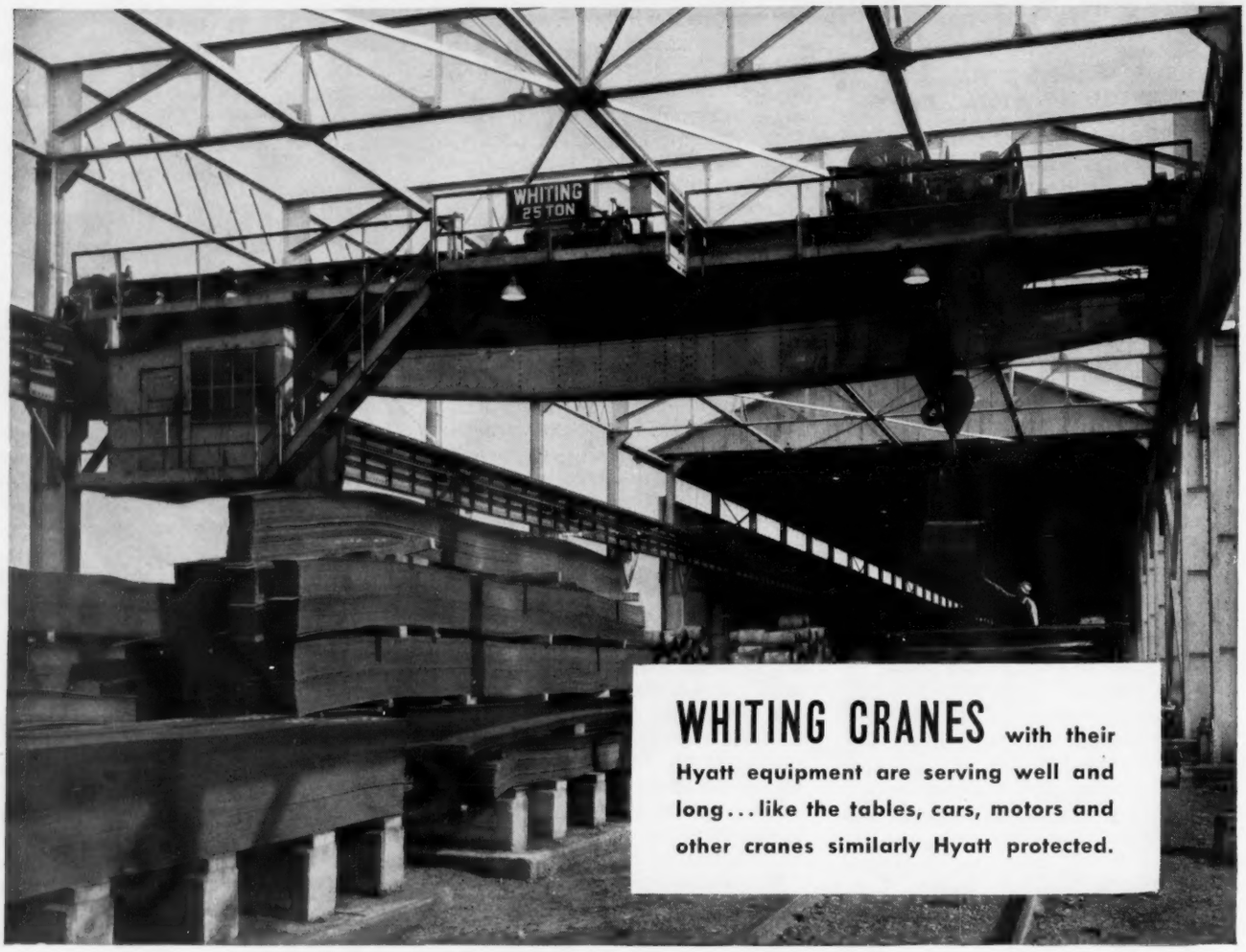
Substantial foreign buying of American aeronautical products is imminent. An air mission from neutral Belgium is enroute to the United States, expecting to spend $6,600,000 for fighting planes. Venezuela already has sent a buying mission here. Last week Sweden's parliament allotted funds for 102 military aircraft, on which American builders probably will figure.

Newly-laid plans for "hemisphere defense" may result in large federal orders for flying equipment in addition to those already placed or scheduled. Informed Washington circles last week revealed the administration may ask congress to appropriate $100,000,000 for 500 long-range, four-motored bombing planes, each costing approximately $200,000.

Recent navy awards include a booking by Pratt & Whitney division of United Aircraft Corp., East Hartford, Conn., engines and parts, $113,563.



■ Large-scale expansion is indicated for Canada's aeronautical industry. Shown above is the first fighting plane designed and built in Canada, a 300-mile per hour Gregor all-metal pursuit produced by Canadian Car & Foundry Co. Ltd., Ft. William, Ont. At right, inspecting fuselages at Toronto plant of De Havilland Aircraft Co. Ltd., now turning out a plane a day for Britain. NEA photos



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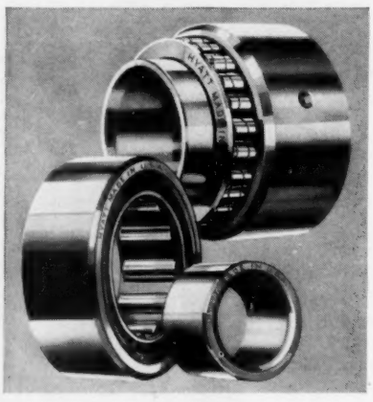
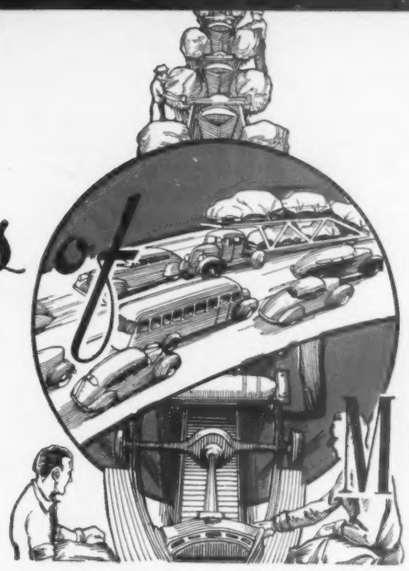


HYATT ROLLER BEARINGS

Mirrors of MOTORDOM



By A. H. ALLEN
Detroit Editor, STEEL

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DETROIT

■ "THE GOAL of the union is the closed shop, with shop stewards over-running the plants. The basis of Marxist communist doctrine is control of production. When shop stewards handle the throttle of production, you have surrendered the plant." So concludes Herman L. Weckler, vice president in charge of operations, Chrysler Corp., in his latest statement on the Chrysler plant tieup which, directly and indirectly, *blitzkreigs* the bread and butter of an estimated 100,000 working people.

Mr. Weckler cites ample evidence to prove the irresponsibility of the UAW-CIO in connection with the Chrysler slowdown, most brazen of which is the statement of Richard T. Frankensteen: "We are picketing and using the tactics of a strike, but we call it a lockout."

On the matter of production rates or standards, the management offered to "make studies on the basis of fairness and equity consistent with quality of workmanship, efficiency of operations and the reasonable working capacities of normal operators. Then, if any employe or group of employes claim that the rate of production is too fast, and the foreman is unable to adjust the matter, the job will be examined again and, if found to be unfair, will be adjusted. The management of each plant is authorized to settle such matters."

The UAW rejected this proposal, and countered with the proposal that the management set production rates at the beginning of the season and then convene with the union to adjust any disputes which might arise later.

While production speeds have been made the public issue in the current Chrysler-UAW dispute, insiders know this is only a smokescreen to cover the real issue which is simply the closed shop or a guarantee of the continuation of the union's income and power.

A parts company personnel director relates an interesting conversation purportedly emanating from one of the high officials of the UAW-CIO in this city not so long ago. In a private talk with an industrial executive, this union leader spoke substantially as follows: "Why don't you guys get wise to yourselves and save all this arguing and bickering over such minor matters as seniority, production speeds, wages and so on. All you have to do is give us the closed shop and the checkoff and there won't be any more trouble; in fact, we'll work with you to keep labor efficiency up and to prevent disputes arising which interfere with production."

While some managements at first might be disposed to accede to such a suggestion and grant the closed shop and checkoff, simply to put an end to wearisome and protracted bickering with unions, they know that once this is done, the union has driven a vital wedge into all industry and would use such a concession as a potent club over the heads of other manufacturers.

The ease with which union or-

Testing "Ride" Stability on Three Wheels

■ **Ruggedness and stability of the 1940 Nash's "Arrow-Flight Ride" was dramatically demonstrated in this three-wheel driving test. With one front wheel removed, the car was driven smoothly through Detroit traffic, making right and left turns with ease. New ride combines independent coil springs in front, leaf springs and airplane-type shock absorbers in rear, center control steering, and rigid shock-proof double frame**

ganizers are able to sway large masses of workmen to their distorted viewpoint, and the woeful lack of knowledge which some workmen have of the constitution of modern industry and its financial structure, have prompted some executives to wonder whether it might not be a good idea to attempt to set up educational courses for high school students on the structure and operation of business and industry—courses designed and perhaps supervised by industrial leaders in various communities.

As an example of how little some young people know of the matter, one company submitted a list of questions to prospective apprentices, all high school graduates and many with later technical training, one question being: "Where does an industry get the money to equip and operate its plants and pay wages?" A typical answer: "From the government."

If hard-headed common sense, plus at least a smattering of general economic knowledge, were the motivating forces persuading workmen to stop work and join picket lines, instead of the spell-binding word imagery of union orators, much of the present labor unrest might never have developed.

■ RECENT comment here on decreases in labor efficiency in the automobile and parts industries have prompted inquiries on the ratio of labor cost to selling cost. Naturally, this percentage varies with the product. On precision parts, speedometers for instance, labor might constitute 70 per cent of the selling price; on simpler parts perhaps as little as 10 per cent.

It may prove interesting to break down the selling price of a typical automobile into its various components. On the basis of information in the financial report of General Motors for 1938, together with data from other sources, a $1000 car may be analyzed approximately as follows:

Dealer margin	$250
Materials, supplies, parts, freight, fuel and other purchases	380
All wages and salaries	213
Dividends	52
Taxes	52
Renewal of plants and equipment	33
Left in business	20

Thus, wages and salaries constitute about 20 per cent of the retail price of a car, closer to 30 per cent of the manufacturer's price to the dealer. The figure of $213 listed above includes executives' salaries, but these figure out to only $4, leaving the balance for other wages and salaries.

Labor costs are apparently the second most vital factor in producing cars, purchases coming first. This is why interferences to production and sudden decreases in efficiency have such a paralyzing effect. Consider the cost to Chrysler of the 84 strikes and stoppages of production; 65 slowdowns; 64 evictions from plants, involving 91 employes; 18 instances of plant picketing, principally to collect dues; and 100 cases of intimidation involving 136 employes, all experienced in the period April 6, 1937, to Sept. 30, 1939, and all in violation of a clause in the contract with the union which expressly forbids any stoppages in Chrysler plants.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1937	1938	1939
Jan.	399,186	226,952	356,950
Feb.	383,900	202,597	317,517
March	519,022	238,447	389,489
April	553,231	237,929	354,263
May	540,377	210,174	313,214
June	521,153	189,402	324,235
July	456,909	150,450	218,478
Aug.	405,072	96,946	103,343
8 mos.	3,778,850	1,552,897	2,377,489
Sept.	175,630	89,623	*192,000
Oct.	337,979	215,286	.....
Nov.	376,629	390,405	.....
Dec.	347,349	406,960	.....
Year	5,016,437	2,655,171	.....

*Estimated.

Estimated by *Ward's Reports*

Week ended:	1939	1938†
Sept. 30	62,755	25,405
Oct. 7	76,095	37,665
Oct. 14	75,860	50,540
Oct. 21	‡74,114	68,360
Oct. 28	78,105	73,335

†Comparable week.
‡Revised.

	Week Ended Oct. 28	Oct. 21
General Motors	40,375	‡39,839
Chrysler	1,445	‡ 1,695
Ford	20,950	19,950
All others	15,335	‡12,630

■ AUTOMOTIVE engineers are studying the merits and costs, particularly the latter, of two new accessories which appear destined to figure prominently on cars of the future. One is an electric speedometer; the other an electric pressure-type fuel pump. Both have been developed by Stewart-Warner Corp.

Present speedometers are driven through gearing off the propeller shaft which operates a flexible cable sheathed in a flexible tube and connected to the instrument on the dash. At one time the cable comprised a steel link chain, but this was superseded over 15 years ago by a steel cable comprising a central steel wire core over which are wound three four-strand sets of fine piano wire, the second set wound in reverse direction to the other two. This makes an extremely stiff yet flexible cable about ⅛-inch in diameter. The tubing carrying this cable is wound to about ½-inch diameter of steel D-wires and T-wires, these referring to the cross-section of the strands, the T-wires filling in the depression between two adjoining D-wires.

Such cables can be produced to a maximum practical length of about 100 inches; beyond that operating difficulties begin to creep in. Cable speed is about 1000 r.p.m. at 60 miles per hour car speed. When engines are moved to the rear, as is expected in a few years, it will be impractical to use a long speedometer cable and so work has been directed toward developing the electric-type speedometer, along the lines of present tachometers.

Present design comprises a small sending unit, 5 inches long and 3½ inches in diameter, essentially a three-phase synchronous generator with nine "fields" arranged in a circle inside a cup-shaped permanent magnet, the latter driven through S. A. E. 4615 steel gears from the transmission output shaft. Speed is 2000 r. p. m. at 60 miles per hour. Three wires run from the sending unit to a small synchronous motor on the speedometer, in which are six "fields" positioned circularly. Speed of the generator of course delivers current proportionately to the motor which in turn actuates the speedometer needle.

Used in Ford Rear-Engine Buses

Installations have been made on Ford rear-engine buses, including some for shipment to Europe, and while the higher cost would work against installation on passenger cars now, sufficient expansion in production conceivably could bring costs into line.

The electric fuel pump is designed to be mounted adjacent to the fuel tank and supplies gasoline under pressure to the carburetor, avoiding the difficulties of "vapor lock" encountered, especially in warm weather, with suction-type fuel pumps now used. The electric device comprises a conventional diaphragm pump to which motion is imparted by a vibrator-type of mechanism similar to a doorbell, except that contacts for breaking the circuit are enclosed in a small sealed glass tube filled with hydrogen. These contacts are actuated by energizing and de-energizing an electromagnet placed over them. Speed under full throttle is only about 250 cycles per minute, and current requirement at normal driving speed is about ⅛ to ¼ ampere.

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•

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MV2-3

Activities of Steel Users, Makers

■ HOLO-KROME SCREW CORP., Hartford, Conn., is erecting a 1-story plant addition, to contain 8500 square feet floor space and to be completed within five weeks. William A. Purtell, president and general manager, states the expansion is not due to any influx of business caused by the European situation, but to a growing demand for the company's products in the domestic market and exploitation of new fields.

♦

Superior Steel Corp., Pittsburgh, opened a new district office in the Union Commerce Bldg., Cleveland, Sept. 11. James D. Clokey Jr. has been selected district manager.

♦

Chicago Bridge & Iron Co., Chicago, has awarded contracts for construction of a 1-story, 50 x 140-foot addition to its plant in Greenville, Pa.

♦

General Malleable Corp., Waukesha, Wis., has just installed a new continuous annealing furnace for castings, made by Holcroft & Co., Detroit. It is 70 feet long, 12 feet wide, 13 feet high, has daily capacity of 12 tons on a 30½-hour cycle. It consists of a well-insulated, gas-tight welded steel case through which pass three sets of tracks.

♦

Ohio Gear Co., Cleveland, has appointed the Standard Machinists Supply Co., Pittsburgh, representative in the Pittsburgh area for its speed reducers and power transmission equipment.

♦

Fidelity Machine Co., Philadelphia, has acquired the business of George Rehfuss & Sons, Philadelphia, manufacturers of fringing and tassel machines.

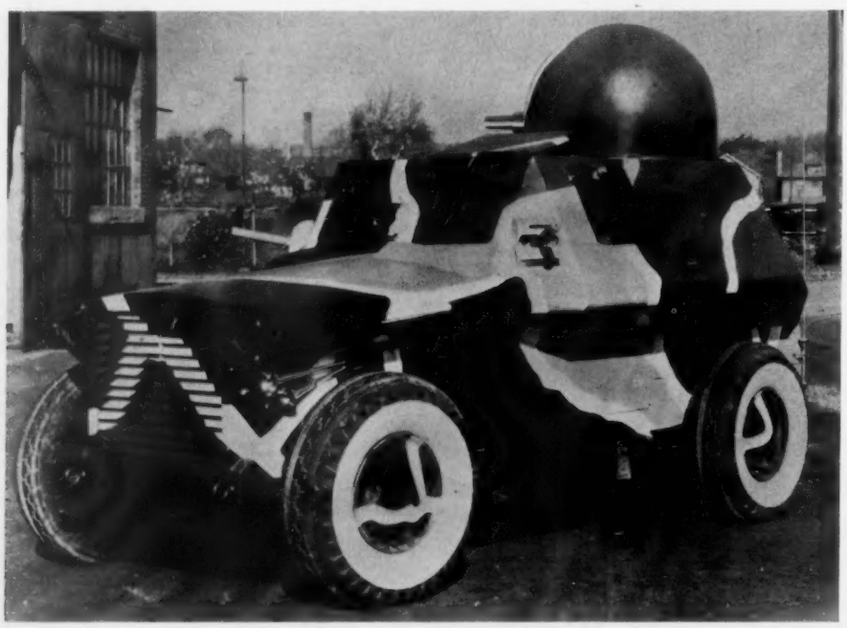
♦

Spencer Lens Co., Buffalo, held open house Oct. 26 in its new mechanical parts plant. Completed scientific optical instruments were shown and experts explained their uses. Some operations were in progress in each department. In attendance were Buffalo business and civic leaders and company employes.

♦

Contract for the design and construction of a $40,000 addition to the Bryant Chucking Grinder Co. plant at Springfield, Vt., has been awarded to the Austin Co., Cleveland, engineer and builder. The addition, which will provide 14,000 square feet of space and includes three 30-foot bays with provisions for crane operations, has been made necessary by increased foreign and domestic orders.

Armored Car Capable of 114 Miles an Hour



■ **Able to climb 50 per cent grades, travel 114 miles an hour and built of bullet-proof armor plate and glass, this antiaircraft combat car, designed by Preston Tucker, Tucker Mfg. Co., Ypsilanti, Mich., has met success in export markets. Welded construction makes the car more bullet-proof by eliminating bolts and rivets which might be driven into the tank by heavy gun fire. It carries three machine guns and a small cannon. Photo, courtesy Lincoln Electric Co., Cleveland**

MEETINGS

CLINIC WILL EMPHASIZE TIME AND MOTION STUDY

■ NINE papers headline national Time and Motion Study clinic to be conducted at the Medinah club, Chicago, Nov. 3-4, under auspices of the Industrial Management society. Papers for two sessions on Nov. 3 are: "Labor's Attitude Toward Cost Reduction Work," by W. L. Daykin, assistant professor of commerce, State University of Iowa, Iowa City, Iowa; "Time and Motion Study from the Human Angle," by A. B. Segur, president. A. B. Segur & Co., Oak Park, Ill.; "Time Study for the Shop Viewpoint," by E. L. Berry, assistant general manager, Pershing Road plant, Link-Belt Co., Chicago; and "Practical Solutions to Manufacturing Problems Through Work Simplification," by A. H. Mogensen, industrial consultant, New York.

Papers for two sessions on Nov. 4 are: "Leveling the Time Study," by R. E. Green, B. F. Goodrich Co., Akron, O.; "Combining Time Study and Methods Engineering," by H. B. Maynard, president, Methods Engineering council, Pittsburgh; "Exposing Some Fallacies of Time Study Technique," by Phil Carroll Jr., vice president, Dyer Engineers Inc., Cleveland; "How To Get Results from Motion Study," by L. S. Whitson, industrial engineer, Minnesota Mining & Mfg. Co., St. Paul; and "Results of Motion Study to the Individual Worker," by Dr. L. M. Gilbreth, industrial consultant, Montclair, N. J.

Convention Calendar

Nov. 1—Conference on New Technologies in Transportation. At the University of Michigan, Ann Arbor, Mich. Sponsored by the university and *Life Magazine*.

Nov. 3-4—Industrial Management society. National Time and Motion Study Clinic at Medinah club, Chicago. Headquarters are at 421 Engineering building, Chicago.

Nov. 6-8—Associated Traffic Clubs of America. Eighteenth annual convention at Palmer House, Chicago.

Nov. 10—Eastern States Blast Furnace and Coke Oven association and Blast Furnace and Coke Association of the Chicago District. Joint meeting at University club, Cleveland. G. W. Hewitt, production manager, blast furnace and coke works, Wheeling Steel Corp., Wheeling, W. Va., is chairman

Nov. 14-15—Air Hygiene Foundation of America. Annual meeting at Mellon Institute of Industrial Research, Pittsburgh. Dr. H. B. Meller, 4400 Fifth avenue, Pittsburgh, is managing director.

Nov. 15-16—National Founders' association. Annual meeting at Waldorf-Astoria hotel, New York. J. M. Taylor, 29 South LaSalle street, Chicago, is secretary.

What's New at Pittsburgh . . .

By R. L. HARTFORD
Pittsburgh Editor, STEEL

■ STEELWORKS expansion and modernization programs continue to unfold as mills strive for greater operating efficiency to meet current demand. Newly-announced units include a Fretz-Moon continuous buttweld pipe mill and storage building at Etna works, National Supply Co., and a 32,000-kilowatt power plant at Rankin, Pa., by Carnegie-Illinois Steel Corp.

The Etna unit is similar to the mill built last year in the same plant. Company at that time announced additional space was provided for a second unit, which would be installed if the first proved satisfactory and the need were great enough. New unit will be similar to the first. A slightly larger furnace will increase capacity somewhat, but mechanical features are unchanged.

Contracts have been let on all material and construction will be started immediately. Mill is scheduled to begin pipe production March 1, 1940.

♦

New Power Plant at Rankin

At Carrie furnaces, in Rankin, will be built the district's newest power plant. Carnegie-Illinois Steel Corp. has retained Stone & Webster, New York, to design the plant, which will be similar to a unit placed in operation at South works, Chicago, late in 1937. Unit will have lower steam capacity, but will produce 32,000 kilowatts against 25,000 at the Chicago plant. Fuel will be blast furnace gas, supplemented by powdered coal if desirable.

The new plant will supplement power requirements on 25-cycle lines going to several Carnegie plants in this district. In the valley near the new plant are eight Carnegie plants, only one of which, Irvin works, does not use the 25-cycle current.

Eastern newspaper reports to the contrary, no further action has been taken regarding new mills at Irvin works of Carnegie-Illinois, mentioned in these columns Oct. 9, page 20.

♦

Plan $1,000,000 Modernization

Meanwhile, plans are going ahead for a $1,000,000 modernization program at the Pittsburg, Calif., plant of the Columbia Steel Co., U. S. Steel's Pacific coast subsidiary. This calls for relocating the present sheet plant, from a plot adjacent to the wire nail mill to near the present tin plate mill, and the modernization of equipment.

New equipment will include a continuous controlled combustion furnace, a 3-high roughing unit, modern finishing stand, roll grinder and three roll heating furnaces, which will serve the sheet and tin plate mills, along with other more important changes. This follows a program completed about a year ago at the Torrance, Calif., plant which comprised a new 24-inch edging mill, scale breaker and additions to the 23-inch and 22-inch rolling mills, including handling and reheating equipment.

♦

Steel River Shipments Off

River traffic on the three Pittsburgh waterways was disappointingly small in September. Although total shipments were up on the Allegheny and Monongahela, due to heavy coal movement, Ohio river tonnage was off.

Steel shipments on the Ohio declined 10,100 tons to 142,200 from August figure. This represents most of the actual steel shipments, the tonnage on the other two rivers being largely interplant movements.

Observers believe this is due to the change in steel markets, with the shift in emphasis to deliveries. Rush deliveries were the order during September, and steel which ordinarily would have been river tonnage was sent by faster methods. The shorter month likewise cut tonnage.

Smaller coke tonnage was shipped on both the Ohio and Monongahela rivers. Other manufactured commodities showed similar losses. However, increasing coal shipments raised total traffic on the Monongahela over the 2,000,000-ton mark for the first time since August, 1937.

♦

Expands By-Product Business

Pittsburgh Coke & Iron Co. is going more heavily into the by-product business, and set aside approximately $250,000, plus proceeds from a $750,000 bond issue for additions to its Neville island plant. Most of this will go into new chemical production equipment to enlarge company's facilities for converting tar into salable by-products. A portion will be used by Green Bag Cement Co., a subsidiary.

"Seller's Market . . . More Dangerous than Buyer's"

■ American industrialists have learned that no amount of increased business based on war is as profitable in the long run as a steady domestic business based on peacetime requirements, according to M. H. Eisenhart, president, Bausch & Lomb Optical Co., Rochester, N. Y.

"A seller's market is often more dangerous than a buyer's market. The tendency to lean back on a large flow of orders created by disruption of competitors' markets tends to create a false sense of security and ease which is rapidly dissipated when the emergency is over."

He deprecated reports his company is largely devoting productive capacity to military work. "The truth is," he said, "only about 10 per cent of our present business is derived from government orders."

Detroit Machine Tool Builder Holds Own Show

■ **National Broach & Machine Co., Detroit, last week opened a 17,000-square-foot addition to its plant with an exhibit and demonstration of all its machines which had been made ready for the National Machine Tool show to have been held in Cleveland. At left, R. S. Drummond, president and general manager, explains rapid cutting action of Roto-Mill to Ed Vezina, superintendent, gear division, Hudson Motor Car Co. Photo, Don Wood**

Editorial

A Reasonable Profit for Steel

■ WHAT is a reasonable profit for the steel industry?

That is a question which has been asked many times in the past. It is one that is particularly pertinent as of the moment, in view of the fact that steel, after a number of lean years, now is in a sellers' market.

In considering this question it seems practical to focus attention on the industry's actual profits earning record. Over a long period it might be assumed that the average profits returned by any industry could be regarded by that industry as reasonable since they result directly from the prices at which management in the industry allows its product to be sold.

Undoubtedly the best period for such a study is that of the past 14 years, 1925-38, inclusive. This included eight "good" years and six "bad" years. Net profits for the "good" years, 1925-6-7-8-9, and 1930-6-7, respectively, were 5.61, 6.86, 5.22, 6.55, 9.88, 4.54, 4.40 and 6.07 per cent.

Return Must Be Sufficient To Attract Capital for Modernizing Processes

The average for the good years was 6.822 per cent on invested capital. Net profits for the "bad" years were 0.40 in 1931, 0.36 in 1934, 2.09 in 1935 and 0.57 in 1938; net losses were 2.85 in 1932 and 0.90 in 1933. Average in the bad years was a net loss of 0.33 per cent.

On an average, the net profit during these 14 years was 3.4857 annually on the invested capital.

To be reasonable a profit must be sufficiently large to attract the capital that is needed for expansion and modernization. In this respect the steel industry probably has been as successful in recent hard years as any other.

During this period it has kept as fully abreast of technological development as at any time in its history; in fact, depression conditions in many cases forced modernization and increased efficiency in production. A sick industry could not have raised output from 64 to 84 per cent of capacity in the single month of September, with additional gains since.

Steel Must Profit in Good Years To Cover Losses in Lean Periods

But it will be noted that even a profit as low as 3½ per cent would not have been possible over the past 14 years had losses in the bad years not been compensated for by relatively good showing in the good years. A 10 per cent profit looked good in 1929 but subsequent events demonstrated that it was badly needed to help the industry ride out the depression. As it turned out, 10 per cent in 1929 was a reasonable profit.

This lesson should not be overlooked in the current thinking of the steel industry. If steel is to remain a healthy industry, if it is to keep faith with the country, it cannot escape the conclusion that profits are essential and that they must be made when they can be made, to compensate for the showing in lean years just behind and in other lean years that are sure to come sometime in the future.

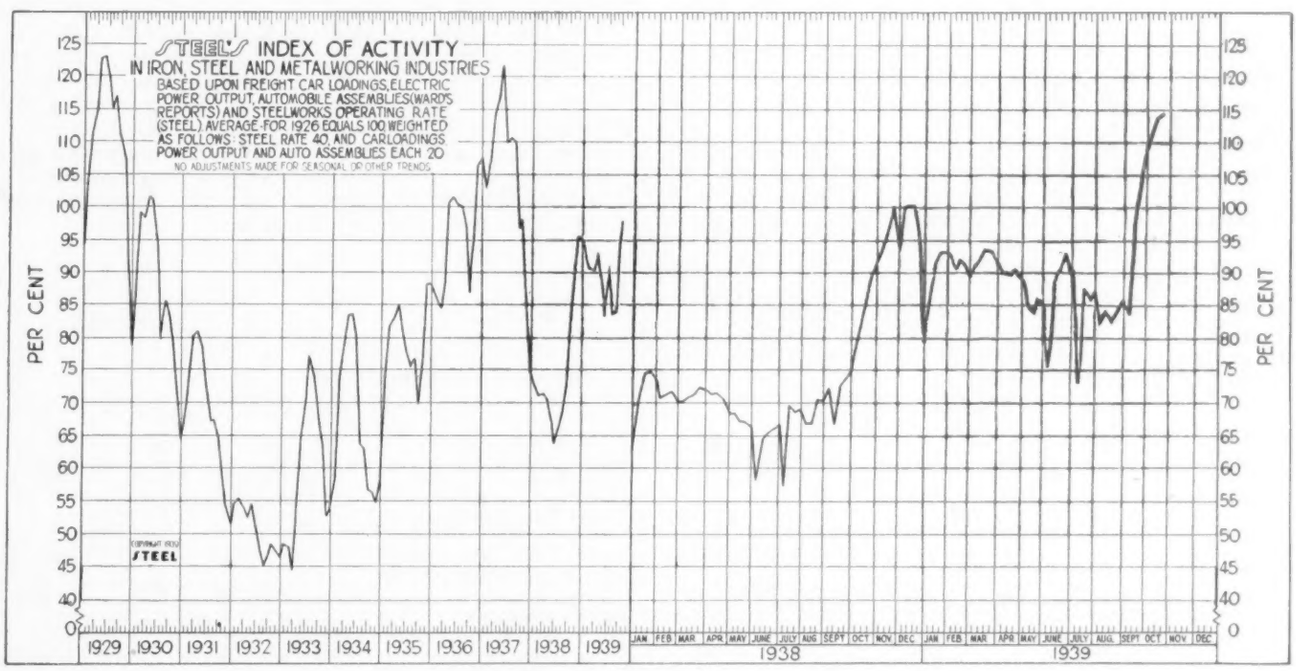
The BUSINESS TREND

Activity Index at Highest Level Since Mid-July, 1937

■ GENERAL upward trend in industrial activity continues to be sustained by huge order backlogs. Current indications point to a further expansion in industrial production during the next 30 days, as many industrial plants overcome bottlenecks in operating schedules. Rapid installation of new and reconditioned equipment also should raise industrial output to a still higher level.

With the growing need for the expansion or reconditioning of production facilities, a revival in the demand for capital goods appears underway. Volume of factory building has shown a steady increase. Private engineering construction awards, reported by *Engineering News-Record* totaled $56,234,000 in the latest two weeks for which figures are available, against $29,366,000 for the corresponding period last year. Railroad equipment purchases continue heavy and may equal the large volume placed during September. Demand for heavy electrical equipment is close to 35 per cent above a year ago. Machine tool orders so far this month have receded only moderately from the September volume, estimated the largest for any month for which figures are available.

Reflecting the upsurge of industrial activity in recent weeks, steelmaking activity has risen to the highest level in history on a tonnage basis; revenue freight


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARDS REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100 WEIGHTED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 0
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
1938
1939

STEEL'S index of activity advanced 0.7 *points to* 114.6 *in the week ended Oct.* 21:

Week ending	1939	1938
Aug. 5	83.5	66.9
Aug. 12	83.9	66.9
Aug. 19	82.2	70.5
Aug. 26	83.4	70.3
Sept. 2	86.3	72.3
Sept. 9	83.7	66.8
Sept. 16	97.5	72.9
Sept. 23	103.0	74.0
Sept. 30	107.9	74.9
Oct. 7	112.5	78.9
Oct. 14	113.9	84.3
Oct. 21	114.6	88.7

Mo. Data	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	....	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	....	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	....	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

carloadings have climbed to the best weekly total since 1930 and electric power consumption remains close to the all-time peak.

During the week ended Oct. 21, STEEL's index of activity in the iron, steel and metalworking industries continued the upward trend of recent weeks to touch the highest level since the Mid-July, 1937. Index now stands at 114.6, a gain of 0.7 point over the previous week and compares with 88.7 recorded during the corresponding week a year ago.

The national steel rate climbed to 91 per cent during the week ended Oct. 21, the highest rate since the week ended May 22, 1937. A year ago the steel rate stood at 51.5 per cent. Close to capacity operations are expected to be maintained throughout the remainder of the year.

Excluding the Labor day week, revenue freight carloadings during the week ended Oct. 21 recorded the tenth consecutive increase to reach the highest level since Nov. 8, 1930. Carloadings in the latest week totaled 861,198 cars, compared with 844,955 during the previous week ended Oct. 14. In the corresponding period last year freight traffic totaled 705,628 cars, while in the comparable 1937 week there were 773,353 cars loaded.

Continued labor trouble resulted in a curtailment of automobile production during the week ended Oct. 21 to 74,114 units. This compares with 75,860 for the preceding week and with 68,360 in the corresponding week a year ago. Heavy sales demand from dealers indicates a noticeable piling up of unfilled orders in all parts of the United States.

Electric power consumption during the week ended Oct. 21 recorded a slight decline, but remained close to the all-time peak reported in the preceding week. Power output in the latest week of 2,493,993,000 kilowatt-hours compares with 2,494,630,000 kilowatts consumed in the previous week ended Oct. 14. A year ago power output was well below the current level at 2,214,097,000 kilowatt-hours.

With production schedules in many industrial plants tuned for capacity operations throughout the remainder of the year, deliveries have become an important problem as manufacturers seek to meet the large volume of business booked for short-term shipment. However, there has been a noticeable decline in the placement of new orders for basic commodities and some requests have been received by manufacturers for slowing down of deliveries on earlier rush orders.

Where Business Stands

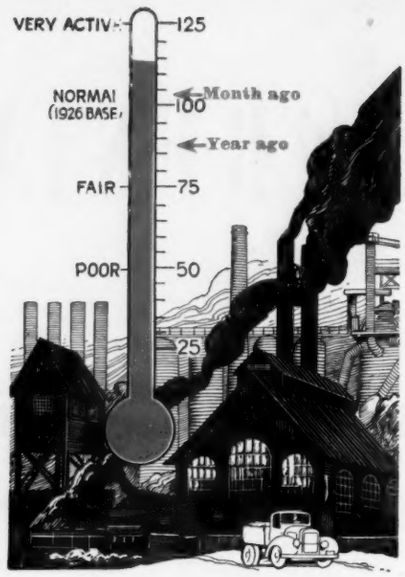
Monthly Averages, 1938 = 100

	Sept., 1939	Aug., 1939	Sept., 1938
Steel Ingot Output	**187.1**	**154.2**	**132.6**
Pig Iron Output	**185.0**	**165.8**	**108.4**
Freight Movement	**136.1**	**118.8**	**113.3**
Automobile Production	***86.8**	**46.7**	**40.5**
Building Construction	**121.3**	**117.2**	**113.0**
Wholesale Prices	**100.6**	**95.3**	**99.6**

***Preliminary.**

Industrial Weather

TREND: *Upward*



The Barometer of Business

Industrial Indicators

	Sept., 1939	Aug., 1939	Sept., 1938
Pig iron output (daily average, tons)	95,757	85,823	56,103
Foundry equipment new order index	184.4	131.4	78.7
Finished steel shipments	985,050	803,822	577,666
Ingot output (daily average, tons)	169,252	139,386	119,921
Dodge building awards in 37 states (valuation)	$323,227,000	$312,328,000	$300,900,000
Automobile output	*192,000	103,343	89,623
Coal output, tons	37,695,000	34,688,000	32,286,000
Business failures; number	758	859	866
Business failures; liabilities	$9,402,000	$11,259,000	$14,341,000
Cement production (bbls.)	†12,369,000	12,644,000	11,007,000
Cotton consumption (bales)	624,902	628,448	533,399
Car loadings (weekly av.)	780,663	682,182	650,112

*Preliminary.
†August, July and August, respectively.

Commodity Prices

	Sept., 1939	Aug., 1939	Sept., 1938
STEEL'S composite average of 25 iron and steel prices	$36.67	$35.95	$36.48
U. S. Bureau of Labor's index	79.1	75.0	78.3
Wheat, cash (bushel)	$1.04	$0.84	$0.80
Corn, cash (bushel)	$0.72	$0.59	$0.67

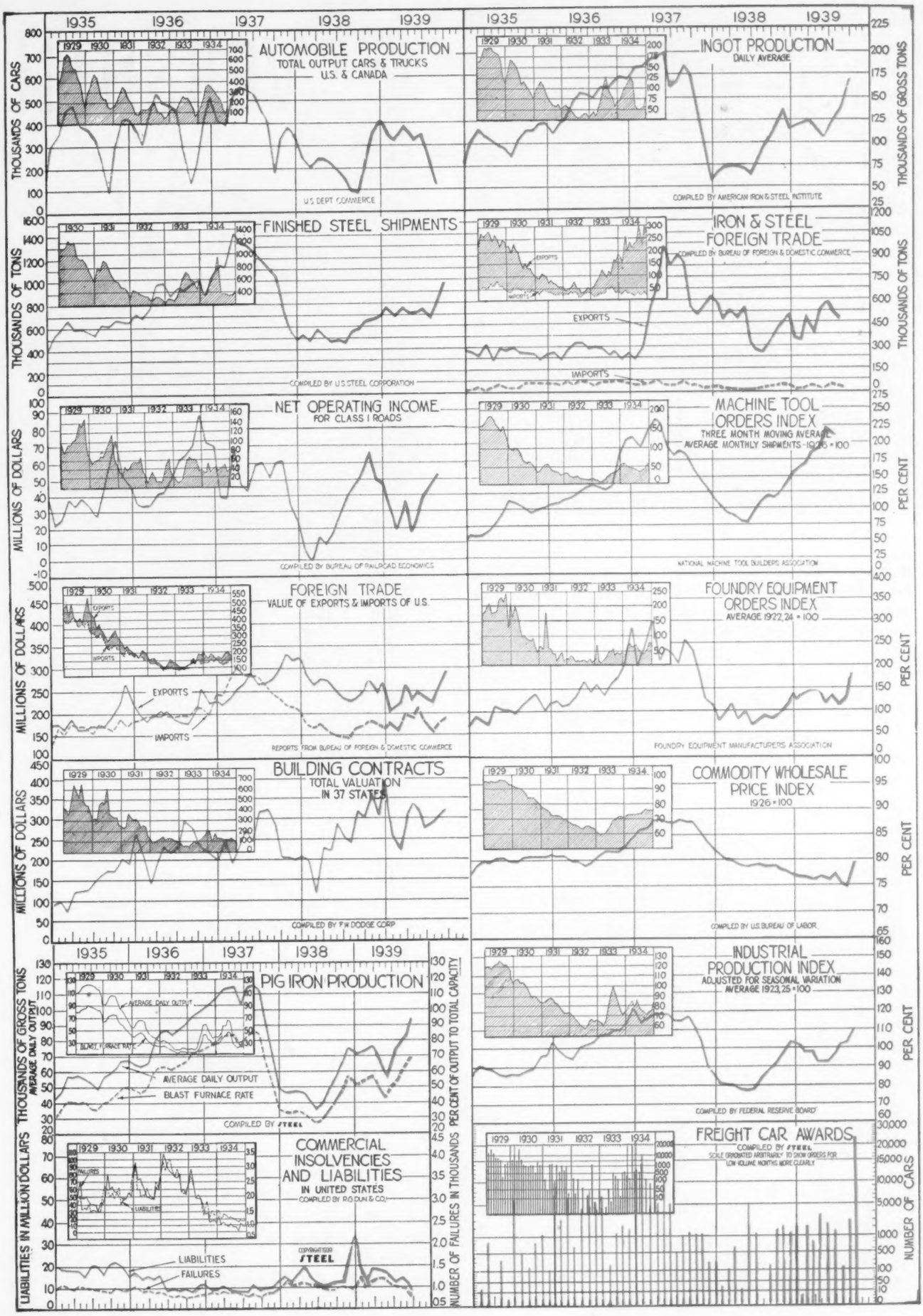
Financial Indicators

	Sept., 1939	Aug., 1939	Sept., 1938
25 Industrial stocks	$196.86	$178.21	$171.70
25 Rail stocks	$24.91	$20.68	$19.68
40 Bonds	$70.56	$71.49	$68.60
Bank clear'gs†(000 omitted)	$22,591,000	$21,386,000	$19,716,000
Commercial paper rate, New York (per cent)	⅝–¾	½–⅝	⅝–¾
*Com'l loans (000 omitted)	$8,350,000	$8,209,000	$8,241,000
Federal Reserve ratio (per cent)	85.0	86.9	82.7
Capital flotations:			
New capital	$41,221,000	$112,129,000	$146,033,000
Refunding	$133,151,000	$346,471,000	$92,335,000
Federal gross debt (millions of dollars)	$40,858	$40,891	$38,395
Railroad earnings	$54,586,246	$49,011,915	$45,421,781
Stock sales, New York stock exchange	57,080,610	17,372,281	23,825,690
Bond sales, par value	$481,361,375	$111,416,850	$134,244,900

*Leading member banks Federal Reserve System.
†August, July and August, respectively.

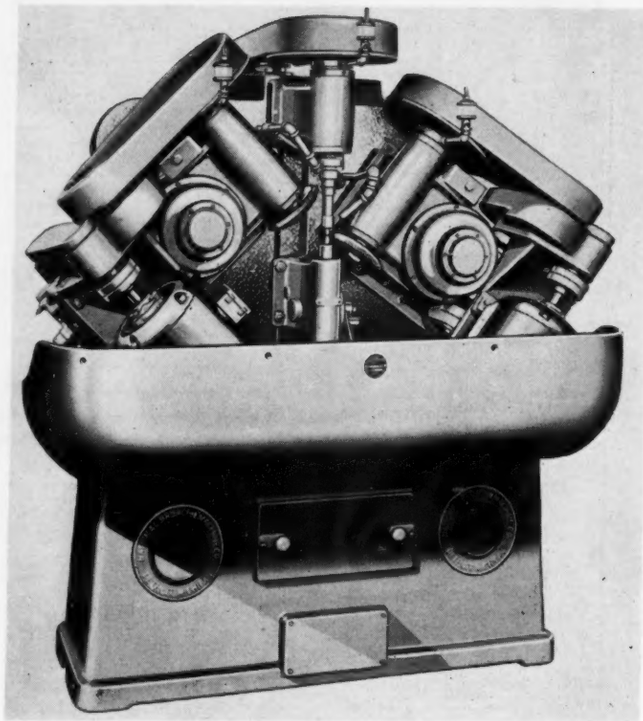
Foreign Trade

	Aug., 1939	July, 1939	Aug., 1938
Exports	$250,839,000	$229,629,000	$230,790,000
Imports	$175,756,000	$168,925,000	$165,516,000
Gold exports	$13,000	$9,000	$16,958
Gold imports	$259,934,000	$278,645,000	$165,990,000

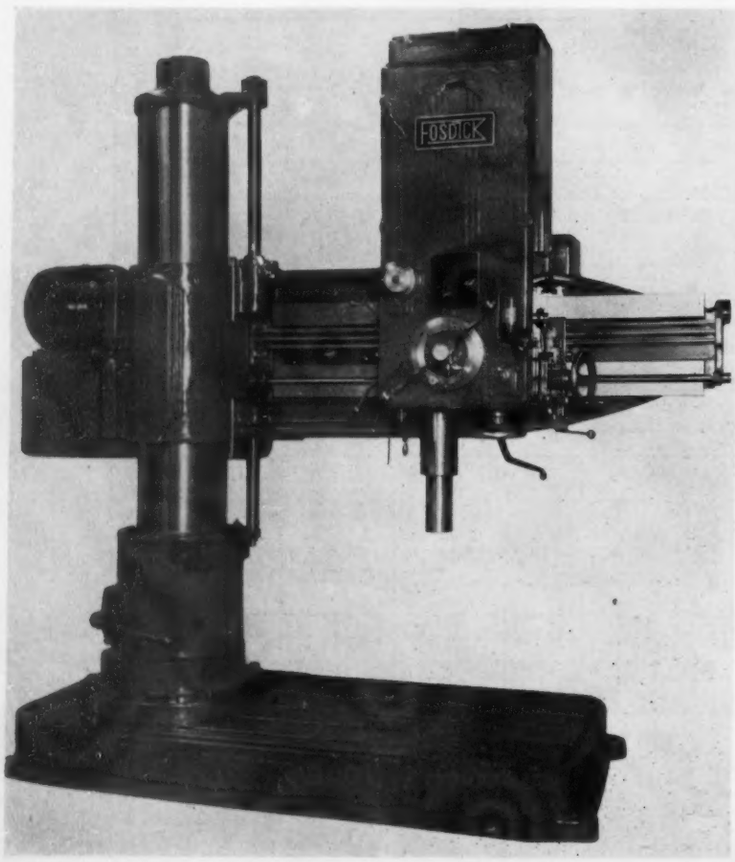

AUTOMOBILE PRODUCTION
TOTAL OUTPUT CARS & TRUCKS U.S. & CANADA
U.S. DEPT. COMMERCE
INGOT PRODUCTION
DAILY AVERAGE
COMPILED BY AMERICAN IRON & STEEL INSTITUTE
FINISHED STEEL SHIPMENTS
COMPILED BY U.S. STEEL CORPORATION
IRON & STEEL FOREIGN TRADE
COMPILED BY BUREAU OF FOREIGN & DOMESTIC COMMERCE
EXPORTS
IMPORTS
NET OPERATING INCOME
FOR CLASS I ROADS
COMPILED BY BUREAU OF RAILROAD ECONOMICS
MACHINE TOOL ORDERS INDEX
THREE MONTH MOVING AVERAGE
AVERAGE MONTHLY SHIPMENTS - 1926 = 100
NATIONAL MACHINE TOOL BUILDERS ASSOCIATION
FOREIGN TRADE
VALUE OF EXPORTS & IMPORTS OF U.S.
REPORTS FROM BUREAU OF FOREIGN & DOMESTIC COMMERCE
FOUNDRY EQUIPMENT ORDERS INDEX
AVERAGE 1922-24 = 100
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION
BUILDING CONTRACTS
TOTAL VALUATION IN 37 STATES
COMPILED BY F.W. DODGE CORP.
COMMODITY WHOLESALE PRICE INDEX
1926 = 100
COMPILED BY U.S. BUREAU OF LABOR
PIG IRON PRODUCTION
AVERAGE DAILY OUTPUT
BLAST FURNACE RATE
COMPILED BY STEEL
INDUSTRIAL PRODUCTION INDEX
ADJUSTED FOR SEASONAL VARIATION
AVERAGE 1923-25 = 100
COMPILED BY FEDERAL RESERVE BOARD
COMMERCIAL INSOLVENCIES AND LIABILITIES
IN UNITED STATES
COMPILED BY R.G. DUN & CO.
LIABILITIES
FAILURES
COPYRIGHT 1939 STEEL
FREIGHT CAR AWARDS
COMPILED BY STEEL
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
THOUSANDS OF CARS
THOUSANDS OF TONS
MILLIONS OF DOLLARS
PER CENT
THOUSANDS OF GROSS TONS
AVERAGE DAILY OUTPUT
PERCENT OF OUTPUT TO TOTAL CAPACITY
LIABILITIES IN MILLION DOLLARS
NUMBER OF FAILURES IN THOUSANDS
NUMBER OF CARS

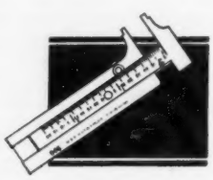
VERSATILE

■ Brown & Sharpe No. 5 plain grinding machine, above, has a kneehole allowing operator to sit at work and will rapidly grind small duplicate cylindrical parts to close limits on a production basis. Machine comes in 3 x 12-inch and 3 x 18-inch sizes. Sizing is to 0.0001-inch on work diameter. Wheel spindle has four work speeds and cross feed is automatic or hand operated. All controls are grouped within easy reach of operator. Headstock operates automatically. Brown & Sharpe Mfg. Co., Providence, R. I.



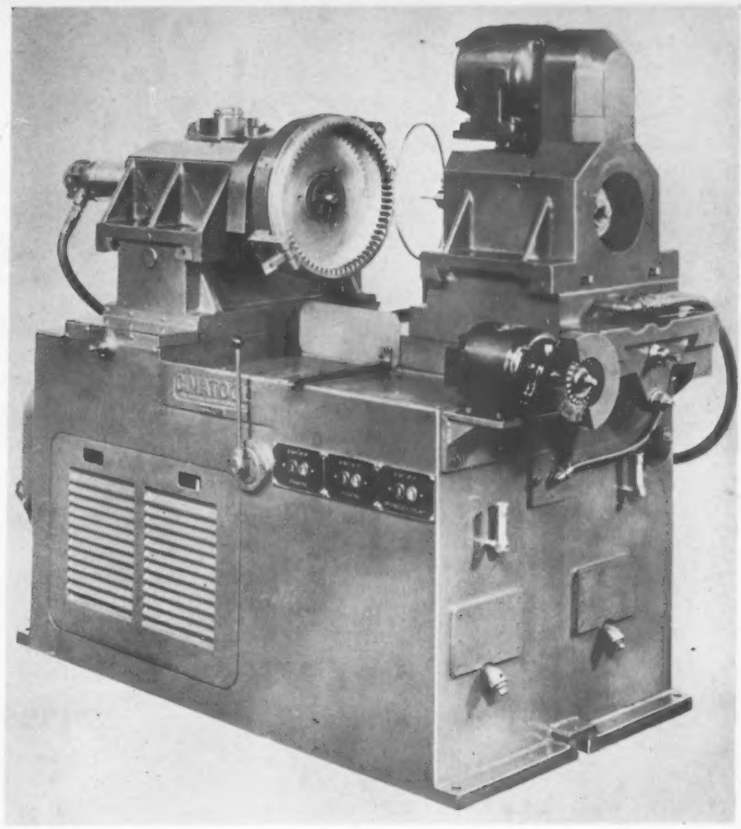
■ National Broach & Machine Co. Roto Shaving machine, above, is being used extensively for sizing and truing blanks prior to gear cutting and other operations, where stock removed is from 0.010 to 0.015-inch on flat flanged surfaces or 0.020-inch on diameter of cylindrical parts. As many as five surfaces can be machined simultaneously and tolerance on diameters can be held to 0.001-inch. Finish has texture of a ground surface. National Broach & Machine Co., Shoemaker and St. Jean streets, Detroit

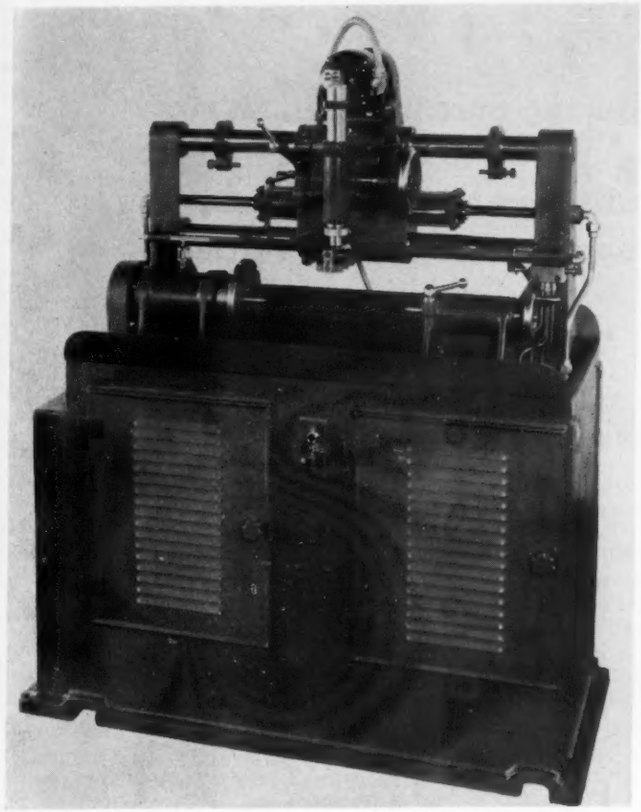




■ Fosdick radial drill, left, has 36 spindle speeds available through a hydraulic shifting mechanism having a large dial on which all speeds appear. Speed selection can be made during drilling. Variable rapid traverse has speed up to 20 feet per minute. Hydraulic motor raises and lowers drill arm and clamping of outer to inner column is also accomplished hydraulically. Spring counterbalance in head maintains proper tension on spindle. Entire hydraulic mechanism is interlocked. Fosdick Machine Tool Co., Blue Rock and Apple streets, Cincinnati

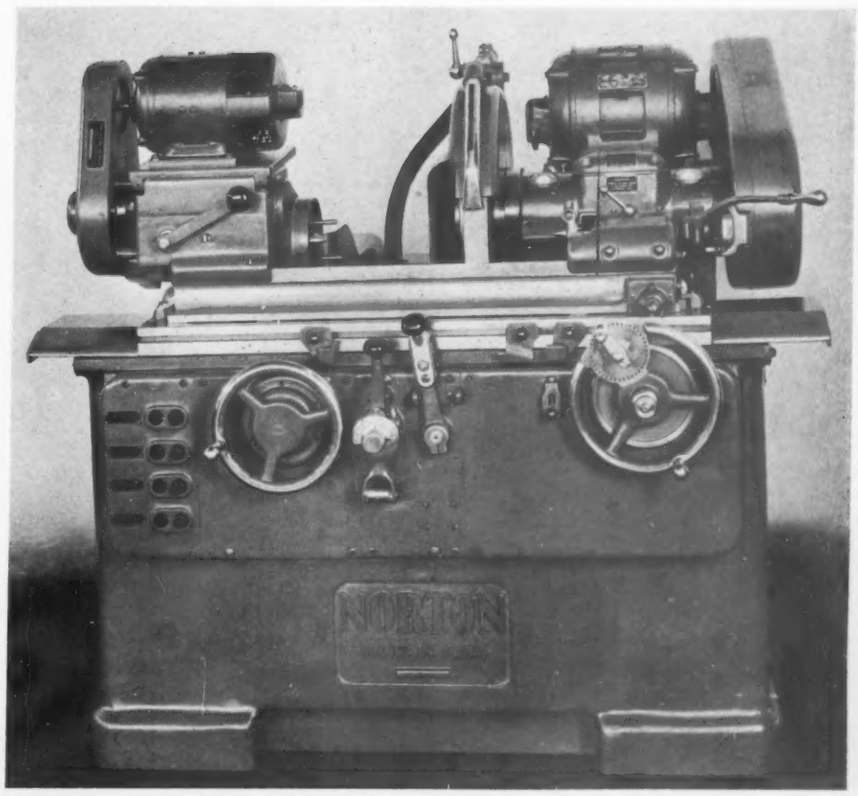
New Machines





■ Cimatool No. 201-A contour burring machine, above, automatically burrs ends of internal and external gear teeth over their entire profile, top, sides and root. Cutter spindle carries a pencil cutter formed according to type of tooth and shape of cut. Work spindle head operates with three distinct motions controlled hydraulically by simple cams. Cimatool Co., Dayton, O.

■ Foster Superfinisher, above, will handle cylindrical parts up to 4 inches in diameter and 18 inches long and will finish their surfaces to a smoothness of 2 to 4 microinches. Will hold work loaded on centers or in a chuck and may be equipped with spring collets and fixtures for special work. Swing is 10 inches. Foster Machine Co., Elkhart, Ind.



■ Norton 6-inch grinding machine, right, has improved larger centers and a headstock with an eccentric take-up of drive chain for proper tensioning. Electric controls are built into back and base ways have protective telescoping guards. Coolant and oil pumps are individually motor driven. Norton Co., Worcester, Mass.

By **WILLIAM L. HAMMERQUIST**
Research Department
Electro Manganese Corp.
Knoxville, Tenn.

Electrolytic

A NEW METALLURGICAL

New method of producing pure manganese may result in important developments in use of manganese as an alloying element and in steel production since behavior of electrolytic manganese is radically different

■ METALLURGISTS have long been familiar with the properties of manganese in its commercially available forms such as ferromanganese, spiegeleisen and crude metallic manganese. They also have been familiar with the impurities inherent in these materials which are the controlling factors in determining their properties—properties entirely different from those of pure metallic manganese.

Now a commercial metallic manganese with a purity of 99.94 per cent and better has been made available by Electro Manganese Corp., Knoxville, Tenn. As a result, the concept of manganese as an alloying addition agent, as a base for an alloy series and as used in steel processes has been changed. The entire field must be re-explored and many theories revised due to the radically different behavior of electrolytic manganese as compared with the manganese heretofore available.

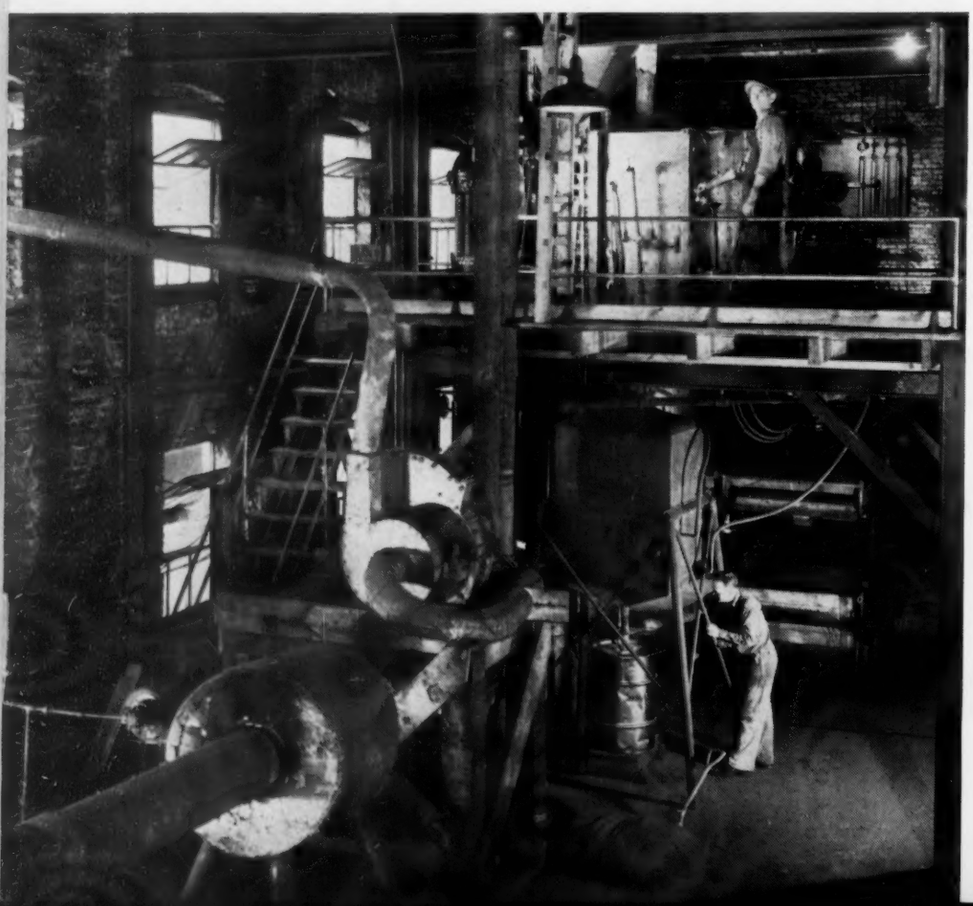
The successful electrolytic production of manganese is the result of more than 20 years of research by many investigators. However, it has been only within the last two years that the process has been made an economic success and has been considered commercially.

Either high or low grade manganese ores can be used as raw materials which makes this production entirely independent of foreign sources of manganese. Millions of tons of domestic manganese ores, formerly considered useless, now insure a reliable source of manganese, regardless of foreign situations. The importance of this from the national defense angle alone makes the development of this process of vital interest to the metallurgical industry of this country.

Raw Material into Solution

First step in the production of electrolytic manganese is to bring the raw material into solution as manganous sulfate. For economic and other reasons the raw material must be in a form that will dissolve in dilute sulfuric acid which is a by-product from the electrolytic cells.

With the exception of the carbonates (rhodochrosite), manganese does not occur natively in a form directly leachable in dilute sulfuric acid. In the majority of ores, manganese occurs as manganese dioxide or some other form in a higher state of oxidation than can be leached directly. It is necessary, therefore, to reduce these ores in a furnace



Raw manganese ore is dried, crushed and reduced in this electrically heated reducing furnace, after which it is cooled and stored in 55-gallon drums

...ic Manganese

...L RAW MATERIAL

to manganous ovide which is readily soluble in dilute sulfuric acid.

Present practice is to feed manganese ores into a continuous, electrically heated furnace, against a counter-current stream of producer gas. The ore is heated between 600 and 700 degrees Cent. for 30 to 60 minutes, cooled to less than 100 degrees Cent. and dropped into 55-gallon drums fitted with clamped tops. Former practice was to cool and store in a large steel bin but it was found that when 30 tons or more of this reduced ore was allowed to stand in contact with air, it began to oxidize and heat. As the temperature rose, oxidation was accelerated and eventually the temperature reached a point where it was a distinct fire hazard. Naturally, the reoxidized ore was unleachable and had to be recirculated through the reducing furnace.

Low Iron Content Ores Used

All manganese ores contain iron in amounts varying from less than 1 to greater than 40 per cent. This iron must be removed from the electrolyte before it is electrolysed and the ideal method of removal would be by magnetic separation prior to the leach. Attempts have been made to produce a magnetic iron oxide in the reducing furnace simultaneously with the manganous oxide but so far the development work on this phase of the process has not been completed. Consequently, manganese ores with a low iron content are being used temporarily.

Reduced ore is leached in 8000-gallon batches of spent electrolyte which contains 200 grams per liter ammonium sulfate, approximately 24 grams per liter sulfuric acid and a small amount of manganous sulfate. Each batch of spent electrolyte is analyzed for its constituents and to this is added the calculated amounts of reduced ore, sulfuric acid, and ammonium sulfate (if necessary) to give the final leach an analysis of 200 grams per liter ammonium sulfate and 70 grams per liter manganous sulfate.

The crude leach solution is first filtered to remove residue and then pumped to the first purification tank. The solution now contains such impurities as iron, arsenic, nickel, cobalt, molybdenum, phosphorus and various others depending upon the ore used. It has been found that current efficiency is largely a function of electrolyte purity. In fact, the effect of electrolyte purity is so great and the control of impurities in concentrations of parts and fractions of parts per million is so difficult, that measurement of the effect of other factors on current efficiency have been inconclusive so far. Consequently, each purification step is carried to the extent that the presence of the various impurities can not be detected by the most sensitive chemical tests known.

Arsenic and iron are the first impurities to be removed. This is done in an alkaline solution which is made sufficiently basic by the addition of gaseous ammonia. Air is blown into the solution as the ammonia is added to accelerate the oxidation of iron which precipitates as ferric hydroxide. This method does not remove the final traces of iron and the reaction is not pushed too far or there would be excessive loss of manganese. Arsenic is either chemically combined or adsorbed in the precipitation of ferric hydroxide, provided there is sufficient iron present. If the original iron content is less than 0.1 grams per liter, iron must be added in the form of metallic iron or ferrous sulfate.

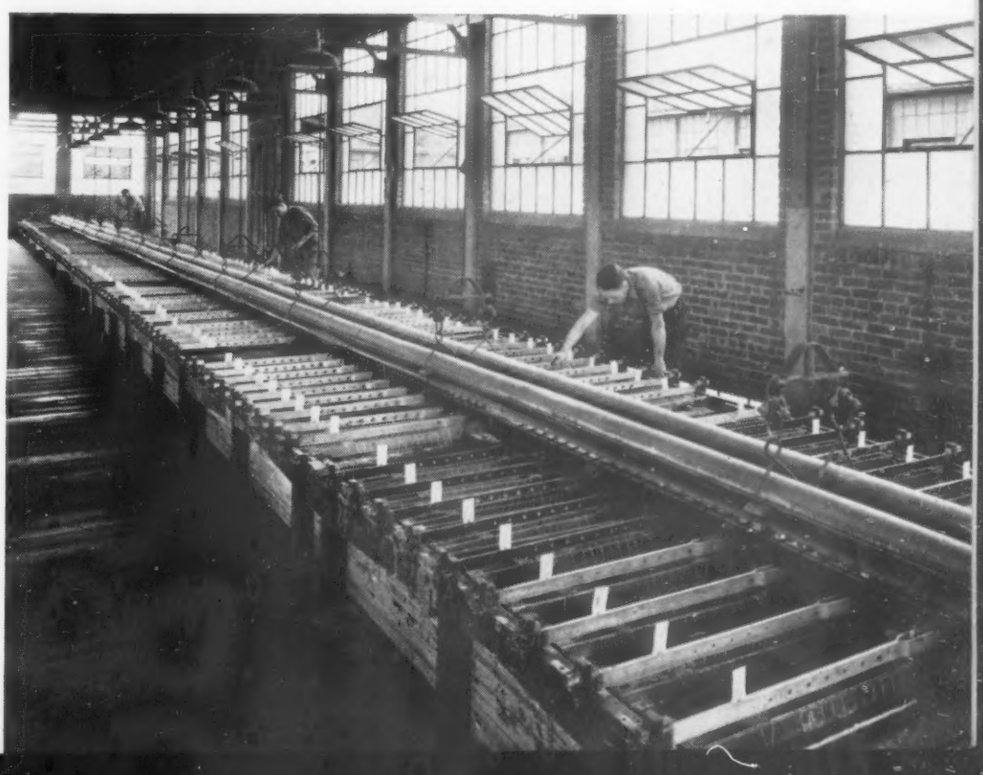
The solution is allowed to stand for 3 to 4 hours, filtered and pumped to the next purification stage where nickel, cobalt and the final traces of iron are removed. As solution is pumped, it is passed through a small, lead lined processing tank, equipped with a motor driven agitator, where it is treated with ammonium sulfide.

Heavy Metals Precipitate

When ammonium sulfide is added to the alkaline solution, there is an immediate precipitation of a mixture of cobalt, nickel, iron and manganese sulfides. Other heavy metals, if present, will also be precipitated. The solution is not immediately freed from impurities, however, and must be allowed to stand for 6 to 12 hours. The solution is tested at intervals, and when found free from impurities, is filtered and pumped to the catholyte storage tanks.

If, in addition to the above impurities, vanadium, titanium, molybdenum and certain other metals are present, special treatments are necessary.

The purified electrolyte as it enters the storage tanks is alkaline



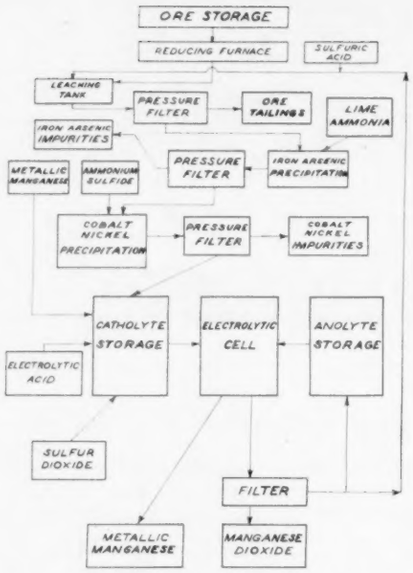
Electrolytic cells are arranged in 2-row batteries between which lead pipes carry electrolytes to cells. Battery shown here can produce a ton a day of pure electrolytic manganese

and contains only manganous and ammonium sulfates, together with traces of ammonium sulfide and a few soluble metal sulfides. Alkaline solutions of manganous sulfate are quite unstable, even in the presence of ammomnium sulfate, and unless precautionary measures are taken immediately, the manganese will begin to oxidize and precipitate out as hydrated manganese dioxide. To prevent this, sulfur dioxide is added until it reaches a concentration of 0.1 grams per liter. It is difficult to control this concentration within reasonable limits in the storage tanks and further additions are made by bubbling sulfur dioxide gas into the catholyte feed lines as it goes to the electrolytic cells.

Cathode Is Stainless Steel

The purified solution is electrolysed in ruggedly constructed laminated wood cells, lined with a proprietary phenol plastic. Each cell measures 96 x 28 x 43 inches and has capacity for 27 lead anodes and 26 cathode compartments. Cathode compartments are constructed of oak covered with a canvas diaphragm and have a capacity of approximately 5 gallons. Each compartment is slotted to accommodate a 36 x 18-inch stainless steel cathode. The electrical elements in each cell are connected in parallel and the cells are connected in series. The circuit is such that any individual cell can be short-circuited out of the system for cleaning or repairs.

The cells are arranged in two rows, as shown in an accompanying illustration. Between the cell lines are two lead pipe lines which conduct the electrolytes to the cells. One line conducts purified leach sollution (catholyte) to the cathode compartments; the other circulates spent electrolyte (anolyte) to the anode section of the cells. Below the feed lines is a launder which carries away the overflow.



Flow chart of the process for producing pure manganese

Catholyte feed is regulated by maintaining a constant head in the feed tank and by feeding the individual diaphragm through a small orifice drilled in a short length of hard rubber rod. This device, known as a spinet, is inserted in a short length of rubber tubing which taps the feed line and conducts the catholyte directly to the cathode compartment. These feed tubes are shown in an accompanying illustration.

Rate of catholyte feed is adjusted to obtain maximum stripping of manganese from the solution. There are other factors, too numerous to mention, which also affect feed rate, the most significant being pH and manganese concentration of the feed solution, current density and pH attained in the diaphragm during electrolysis.

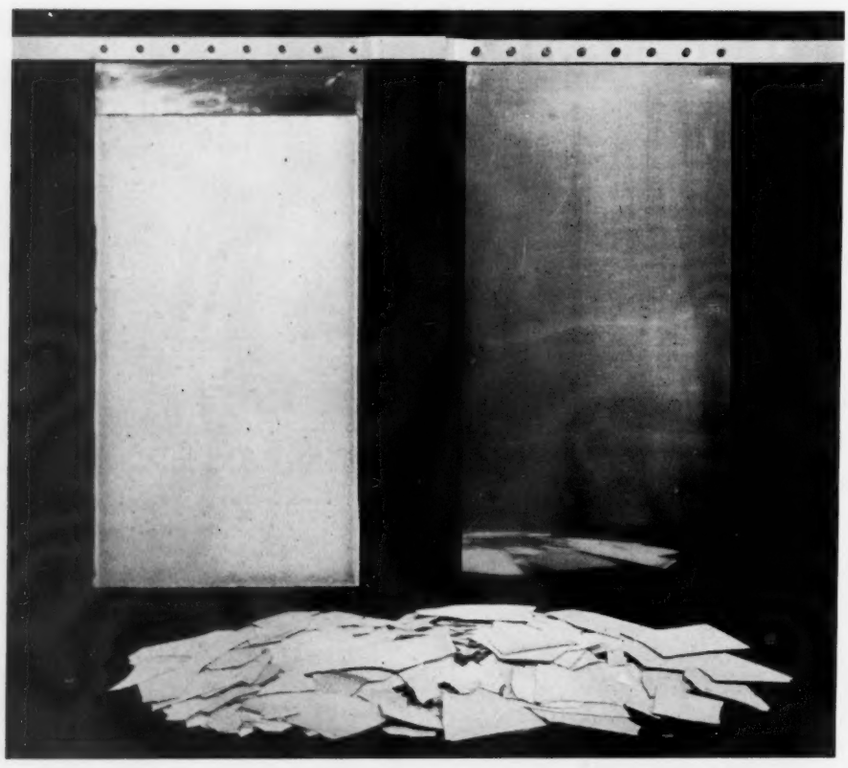
Rate of anolyte circulation is not as sensitive as the rate of catholyte feed. The most important considerations in determining anolyte flow rate are removal of anode sludge by sluicing action and temperature control. Anolyte is fed in at the bottom of the cells to agitate the sludge which settles there, and is overflowed through parts into a launder which carries it to a sump tank. It then is filtered and pumped to anolyte feed tanks for recirculation.

Manganese is plated on 16-gage stainless steel cathodes. This type of steel was selected after many tests because it resists corrosion at the liquid-air junction. Mild steel, such as cold rolled, rusted badly above the liquid level and caused much trouble due to corrosion products dropping into the solution and inhibiting plating.

Cathode Surface Important

Surface condition of the cathode is of extreme importance. It must be clean and finished to a standard 3B finish. If rougher, manganese is difficult to strip; if it is smoother, the deposit will peel of its own accord during the plating operation due to internal stresses. There are many factors which affect the adhesion of the deposit to the cathode. If the deposit is smooth, hard and dense, it will usually strip easily provided, of course, the cathode surface is of the proper smoothness. If the deposit is porous, rough or badly treed it is usually difficult to remove the metal even from smooth cathodes. This condition also has some effect upon the purity of the deposit.

Present practice is to plate at a current density of 22.5 amperes per square foot, and an impressed voltage of approximately 5 volts. During electrolysis, if the cells are oper-



Electro manganese is plated on stainless steel cathodes which must be polished as at right. At left is a typical deposit. Plates of stripped manganese are in foreground

ating properly, an equilibrium is attained at which the manganese content and pH of the electrolyte in the diaphragm remain constant. The point at which this equilibrium is attained is determined by the current density, manganese concentration, pH and rate of catholyte feed. By means of a few simple chemical tests, it is easy to determine when this equilibrium has been reached and whether or not it is being maintained. Under present operating conditions current efficiency at the cathode is in the order of 50 to 60 per cent. It is expected that this will be improved.

As metallic manganese is deposited at the cathode there also is a certain amount of manganese dioxide formed at the anode. The amount is dependent upon several factors, the greatest of which appears to be the manganese concentration of the diaphragm overflow. This is one of the reasons it is desirable to strip as much manganese as possible from the catholyte. The ideal condition, of course, would be to strip all the manganese from the solution but this is not possible under present operating conditions. It has been found that certain lead alloy anodes inhibit the formation of manganese dioxide effectively.

Another product formed at the anode is sulfuric acid. It is the acid thus formed which is drawn off at intervals for use in the leaching operation described above. Of course, it is necessary, from time to time, to make up a fresh leach solution with acid, ammonium sulfate and water to replace leakage, drag-out and filter cake losses.

Plating Cycle About 60 Hours

Plating cycles as long as 120 hours have been run successfully but the usual cycle is about half that time. Under present conditions there is a considerable drop in cathode efficiency after 60 hours of plating and it has been found economic to pull the cathodes after that time for stripping.

When the cathodes are removed they are dipped quickly in a solution which inhibits oxidation of the metal through action of the air. After this treatment, they are washed thoroughly in running water and allowed to dry. If this treatment is omitted, the deposit will turn black quickly upon exposure to air. Treated deposits retain their brightness almost indefinitely.

The dry plates are sent to the stripping floor where they are first flexed back and forth in a jig. In most cases the manganese deposit will flake off during the flexing but sometimes it is necessary to vibrate the cathodes rapidly with an air hammer to remove the entire deposit. The stripped manganese is separated into lots from which samples are taken and sent to the laboratory for analysis. Usual lot size is 1500 pounds, which is the weight a 55-gallon drum will hold.

Cathode Buffed After Stripping

There is always a small amount of manganese left adhering to the cathodes, which is removed with nitric acid. The cathodes then are buffed to a smooth finish, cleaned, redipped in nitric acid to restore their characteristic stainless "passivity" and returned to the cell room.

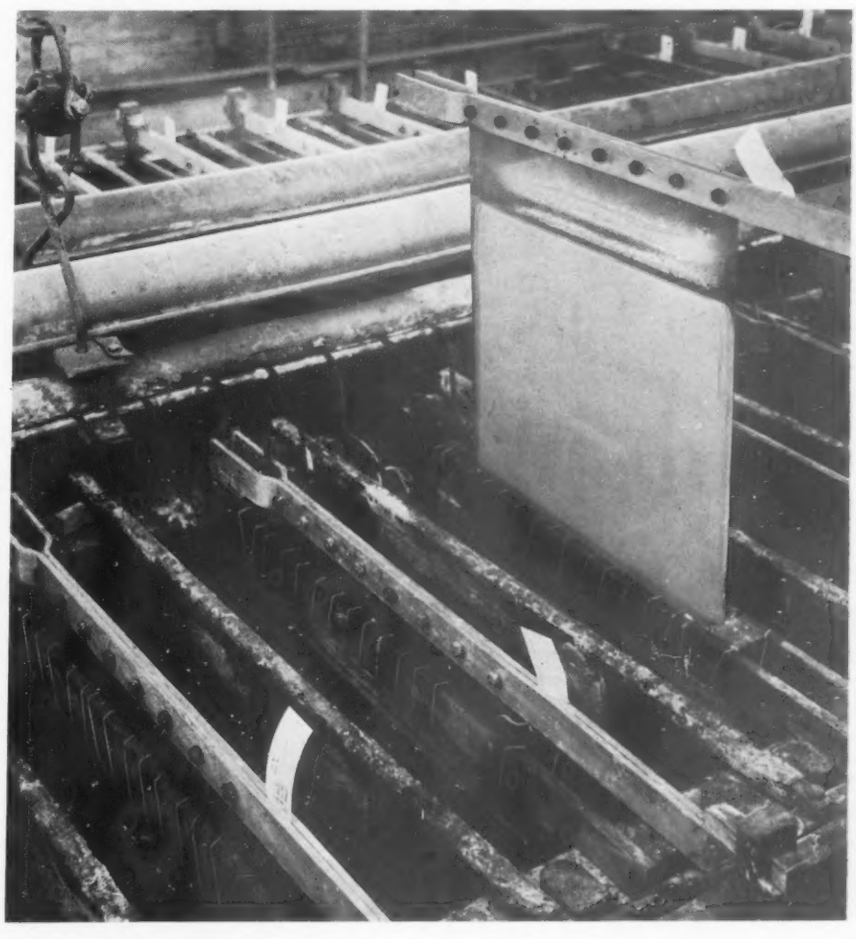
The manganese, as now produced, contains small amount of iron and sulfur as impurities. Both of these impurities are present in amounts varying from 0.002 to 0.02 per cent. Rapid progress is being made in devising methods of holding those amounts to the smaller figure. It is believed that within a short time these impurities will be held to such low limits that only a spectroscope will detect them. This already is true of such elements as lead, molybdenum, nickel, cobalt, aluminum, silicon, arsenic and others. In fact in most cases even the spectroscope fails to reveal the presence of these elements. The metal is carbon free.

Potential significance of this new manganese is difficult to exaggerate and it is much to early to fully appraise its future importance. Manganese-base alloys have been given a preliminary study and have exhibited interesting ranges of strength, ductility, workability, damping capacity, electrical resistance, magnetic permeability, hardenability, stainlessness, etc. American metallurgists will do well to watch and enter into the development of this field. An article devoted to the possibilities of electro manganese alloys will appear in STEEL in the near future.

♦

Stoppers Added to Line

■ As part of an expansion program, Electro Refractories & Alloys Corp., Andrews building, Buffalo, have added stoppers to its line of refractories, alloys and crucibles. The company is erecting four new buildings which are expected to be completed about the first of the year. Included is a new laboratory 50 x 150 feet.



Here is a partially plated cathode withdrawn for inspection. Note rubber tubes which tap catholyte from feed lines directly to individual diaphragms

New Car Dumper

One of fastest and most powerful units yet built, new dumper features much automatic equipment, has capacity for continuous car-a-minute dumping. Coal slides, rather than drops, thus minimizing breakage

■ PENNSYLVANIA railroad's new car dumper at Sandusky, O., capable of dumping sixty 90-ton cars or forty-five 120-ton cars an hour, involves numerous innovations in modern coal handling.

Towering 171 feet above the water level, the dumper was built by Heyl & Patterson Inc., 49 Water street, Pittsburgh, with electrical apparatus furnished by General Electric Co., Schenectady, N. Y. Electrical equipment is designed so the dumper can still handle its maximum load even though a major piece of it fails.

No Car Riders

Cited as one of the most powerful dumpers yet built, direct-current power for mule, cradle and auxiliary drives is supplied by two motor-generator sets, each rated 1275 kilowatts at 720 revolutions per minute. Operation has been made as nearly automatic as possible. Retarders used in the mule pit, cradle and run-back track eliminate necessity for car riders. Electric locomotives deliver cars from storage yard to mule pit.

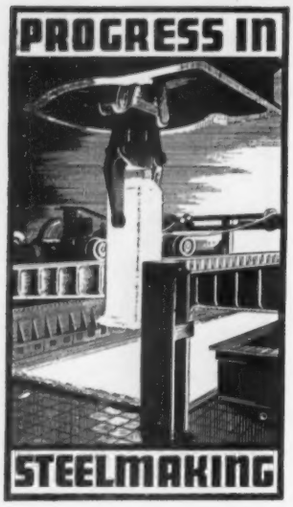
Mule drive has an interlocking circuit to prevent cars overrunning the mule in case of power failure or emergency stop. This also guards against breaking of the hoisting cable. Barney cycle assures loaded cars at the dumper when required, and barney speed is controlled automatically as car is picked up.

Improved dumping rate is aided

(*Please turn to Page* 74)

View of new car dumper from top of switch-back ramp

DEPENDABILITY
PHILO
BRAND
QUALITY • SERVICE
Ohio Ferro-Alloys Corporation
Canton, Ohio



Further Notes on Sponge

By E. P. BARRETT
Metallurgist
Blast Furnace Studies Section
Metallurgical Division
Bureau of Mines
Minneapolis

■ RENEWED interest in sponge iron is a revival of the old search for a "direct process." Early experimenters hoped to develop a method by which high-grade iron or steel could be made at low cost and directly in one step from ore to finished product, while present-day experimenters have the added hope of perfecting a method for producing high-purity iron powder from which small parts may be formed to exact dimensions by pressing and sintering. This hope may lead to the development of a new industry in which iron powder may become commercially important (STEEL, April 10, p. 43).

Reduction of Iron Oxides

Iron oxides may be reduced by heating in the presence of either gaseous or so-called solid reducing agents. In either case the reduction of the oxides proceeds largely, if not entirely, between the gaseous phase of the reducing agent and the solid phase of the iron oxide.

Results of experiments[1] in which Sims and Wood heated mixtures of iron oxides and carbon in an Arsem vacuum furnace indicate that little if any reaction occurs between the solid phases. This conclusion was confirmed by results obtained when iron oxides and carbon were heated in alloy retorts 2 inches in diameter by 6 inches in length.

In one series of experiments the retorts were filled with mixtures of iron oxides and carbon, while in another series the carbon was placed in a Nichrome screen tube at the center of the retort with the ore surrounding the tube.

When mixtures of iron oxides and carbon are heated to a high enough temperature, the carbon reacts with the oxygen or carbon dioxide in the atmosphere surrounding the solid phases to form carbon monoxide, which begins to reduce the iron oxides as soon as sufficient concentration of carbon monoxide has been obtained, according to reactions

$$3\ Fe_2O_3 + CO = 2\ Fe_3O_4 + CO_2 \quad (1)$$

$$Fe_3O_4 + CO = 3\ FeO + CO_2 \quad (2)$$

$$FeO + CO = Fe + CO_2 \quad (3)$$

As rapidly as the CO is consumed by these reactions it is regenerated by the action of the resulting CO_2 upon more of the solid carbon, according to the reaction

$$CO_2 + C = 2\ CO \quad (4)$$

In order that these reactions may be continuous, the conditions must be such that reaction (4) will proceed rapidly enough and to such an extent that the conditions necessary for the reduction of FeO to Fe by reaction (3) will be maintained.

The rate of reduction depends upon the speeds of reactions (3) and (4). The speed of reaction (4) increases with the more porous forms of carbon. The relative order is: Graphite, electrically shrunk carbon, high-temperature coke, anthracite, bituminous coal, lignite and charcoal.

When CO gas is generated externally and passed over heated iron ore, the reaction of reduction will proceed rapidly at a temperature lower than is necessary when CO is generated in the charge.[2] The rate of reduction of the interior of iron ore particles decreases rapidly with increasing size of particles.

The bureau of mines has conducted extensive investigations[1] on the reduction of iron oxides by heating them in contact with various forms of solid carbon. The results obtained from small charges in crucibles, from 10 to 12-pound charges in assay muffles, and from 150-pound charges in an electrically heated muffle furnace, together with a survey of past attempts in sponge iron production, indicated to the bureau engineers that the direct-fired rotary kiln was suited for industrial application to the problem.

Tests were made in a batch-type direct-fired rotary kiln on 65 pounds of a mixture of 100 parts of ore and 60 parts of coal crushed to minus 8 mesh. Results showed almost complete reduction of iron oxides was attained consistently. This is possible in the direct-fired kiln where a stream of gases oxidizing to metal-

In April 10 issue of STEEL appeared a comprehensive article describing current status of sponge iron and iron powder methods with future possibilities. Principally to conserve space, no mention was made of extensive work done by bureau of mines on this subject. However, this research is of such importance that STEEL invited Mr. Barrett to prepare a summary which appears here. STEEL'S editors are indebted to the bureau for its co-operation in compiling this manuscript

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[1] *The Production of Sponge Iron*, by C. E. Williams, E. P. Barrett and B. M. Larsen, bureau of mines Bulletin 270, 1927, p.53.

[2] *The Electric Furnace for Iron and Steel*, by A. Stansfield; third edition, 1923, pp. 151-157.

Iron

A two-diameter direct-fired rotary kiln operates quite successfully. Highly reducing atmosphere is maintained beneath surface of ore. Best results at 950 degrees Cent. Method appears satisfactory for industrial application

lic iron is constantly passing over the heated charge because of the formation of CO gas within the charge. The upward current of CO gas prevents entrance of much CO_2, H_2O and O_2 from the atmosphere above the charge. The hot carbon immediately converts any of these gases that may enter the charge to Co and H_2. The ratios of CO to CO_2 in a series of samples of the atmosphere above the charge and within the charge are given in the accompanying table.

Two-Diameter Rotary Kiln

Results of tests in the batch-type kiln indicated the range of temperatures necessary for rapid reduction of the iron oxides in an ore-coal mixture was between 875 and 1025 degrees Cent., and that a 6-inch layer of the mixture must be heated within this temperature range for about an hour to insure complete reduction.

The two-diameter rotary kiln was designed to operate with the charge fed continuously into the section of smaller diameter and the reduced product discharged continuously at the burner end of the enlarged section. The ore-coal mixture was heated rapidly to reduction temperature as it passed in a thin layer through the section of smaller diameter and then was held in a thicker layer in the enlarged section for an hour at temperatures required for rapid reduction without fusion and sticking.

Partial Analyses of Gases in a Direct-Fired Sponge Iron Kiln

Sample No.	Above the charge CO per cent	Above the charge CO_2 per cent	Within the charge CO per cent	Within the charge CO_2 per cent
1	7.6	9.4	59.2	16.6
2	7.5	11.5	45.8	12.6
3	6 2	11.4	33.6	3.0
4	5 0	11.5	56.5	6.1
5	3.6	11.8	54.0	5.6

A diagrammatic sketch of a two-diameter internally fired rotary kiln for the continuous production of 2000 pounds of sponge iron daily is shown below.

Cooling the Hot Sponge Iron

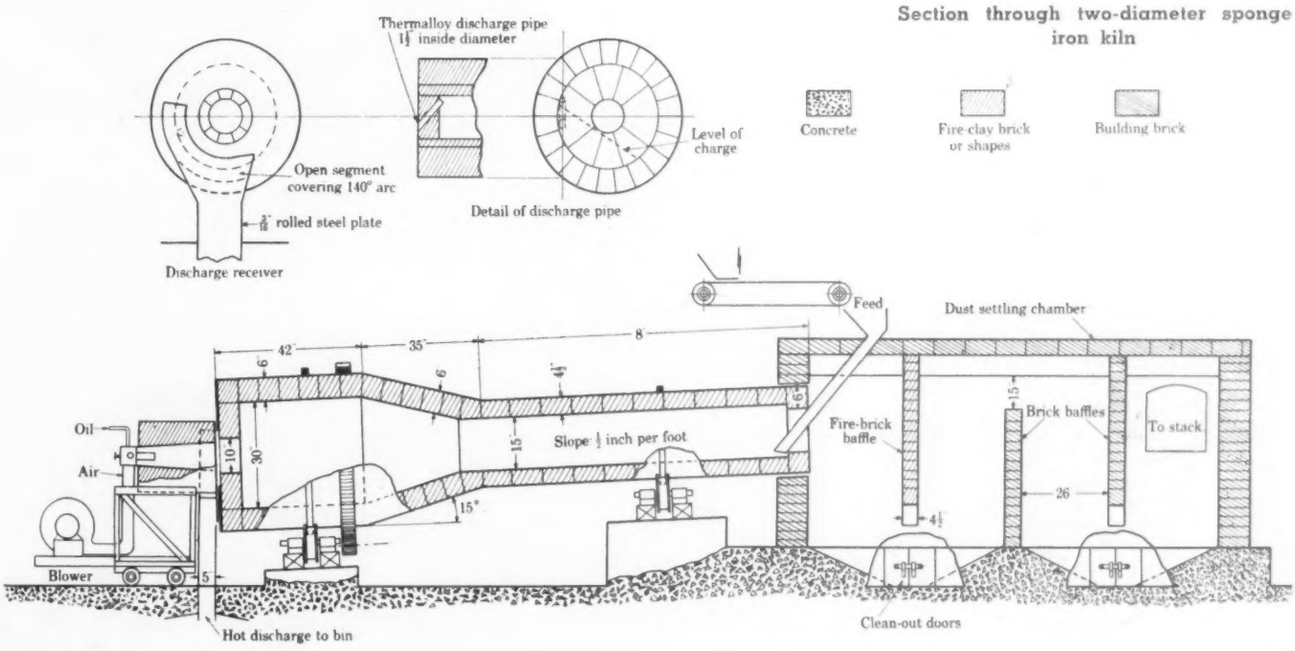
An important problem in the large-scale production of sponge iron is cooling of the hot product as discharged from the furnace. A water-cooled cylindrical steel drum has been used to cool the product discharged from an internally fired rotary kiln producing about 3 tons of sponge iron per day.

Sulphur in Sponge Iron

Few experimenters have emphasized the fact that a large part of any sulphur contained in the reducing agents will be absorbed by the sponge iron produced with them. If sulphur-free sponge iron is required, it will be necessary to use sulphur-free materials.

Elimination of Gangue

Ores containing large amounts of gangue are as undesirable in direct processes as in the blast furnace



Section through two-diameter sponge iron kiln

PENNSALT CLEANERS

PREPARE FENESTRA STEEL CASEMENTS FOR BONDERIZING

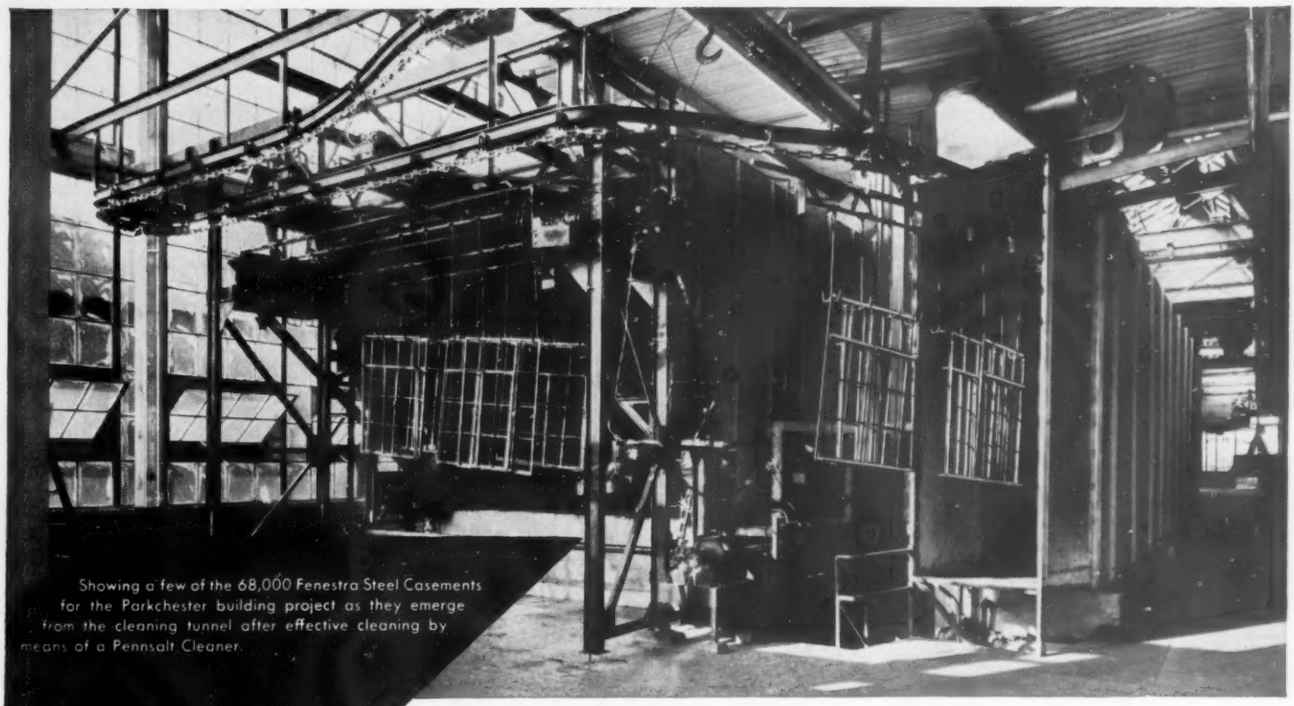
...with a large saving in metal cleaning materials

● **Fenestra Steel Casements are known throughout the building industry for their excellent appearance and all-weather durability. The cleaning operation before Bonderizing plays a key part in giving the frames a smooth satin finish, free from paint-wasting roughness or "sparkle." For this purpose a Pennsalt Cleaner was selected—one that does a quick, thorough metal cleaning job without roughening the metal surface of the windows.**

As a "plus" feature, this Pennsalt Cleaner immediately showed a substantial saving in cleaning materials over the product formerly used.

This is but one of an entire group of Pennsalt Cleaners which have been developed as

Parkchester, now under construction by the Metropolitan Life Insurance Company, is the country's largest building project — a veritable "city within a city," covering 129 acres in the Bronx, New York City. Comprising 51 buildings and 12,269 apartments, it will have 42,000 rooms equipped with 68,000 Fenestra Steel Casements—all cleaned before Bonderizing with one of the new Pennsalt Cleaners.



Showing a few of the 68,000 Fenestra Steel Casements for the Parkchester building project as they emerge from the cleaning tunnel after effective cleaning by means of a Pennsalt Cleaner.

companions to *Orthosil*—the original cleaner of the group, famous throughout industry.

The Pennsalt Cleaners meet every requirement with custom-built precision. They all have exceptional dissolving and emulsifying action, and tremendous lasting power. They insure quick action, thorough cleaning, excellent surface finish, and reduced cleaning cost. They are now in use by scores of leading companies representing virtually every branch of industry.

Why not let us prove in your own plant what one or more of the Pennsalt Cleaners can do for you? Write us for full information. Address Dept. S. Pennsylvania Salt Manufacturing Company, Widener Building, Philadelphia, Pa.—New York · Chicago · St. Louis · Pittsburgh · Tacoma · Wyandotte.

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ANHYDROUS FERRIC CHLORIDE
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MANUFACTURING COMPANY
Chemicals

process. When the physical structure of the ores used in the two-diameter kiln was such that the gangue was not easily separated from the iron oxides, it was equally difficult to separate the metallized particles from the gangue after the oxides had been reduced.

Summary

1. When mixtures of iron ore and noncoking coal are heated in a direct-fired rotary kiln, a highly reducing atmosphere is maintained beneath the surface of the charge although the atmosphere above the charge may be oxidizing to metallic iron.

2. The rate of reduction is slow at 850 degrees Cent., but increases rapidly as the temperature increases. Best results are obtained at about 950 degrees Cent. Temperatures much higher may cause the charge to sinter or the ore to stick to the lining.

3. For best results the ore and coal particles should be about the same size and all minus 4 mesh.

4. A mixture of 60 parts of coal to 100 parts of ore was used successfully.

Selected Bibliography

Professor Waterhouse[3] of the Massachusetts Institute of Technology, Cambridge, Mass., states:

"A great many processes have been proposed for the production of sponge iron. Many of the older ones are described in Chapter 15 of *The Metallurgy of Steel*, by Henry M. Howe, 4th edition, 1895, and in one of the appendices of the same volume. A careful reading of this chapter will repay any student of the subject, in regard both to the processes and the discussion of the uses of sponge iron. Another valuable reference is Bulletin 270 of the bureau of mines (previously mentioned in footnote 1). This contains a detailed discussion of many processes, gives the results of much experimental work, and has a selected bibliography together with a long list of American and foreign patents."

[3] *Manufacture, Properties and Uses of Sponge Iron*, by George B. Waterhouse; paper presented before iron and steel division, American Institute of Mining and Metallurgical Engineers in New York, Oct. 3, 1934.

Seeking Less Expensive Materials For Subzero Temperature Service

■ TECHNICAL papers presented before sessions of the American Society for Metals in Chicago last week during the National Metal congress reflected the tremendous volume of metallurgical research in progress in the United States. Objects of this research are to produce new metals and alloys for new fields and to improve existing ones so that they will meet service requirements which becomes more exacting from year to year. Some idea of the scope of current research is afforded by the following abstracts of important papers.

For applications involving temperatures down to minus 75 degrees Fahr., there are several steels, in both wrought and cast form, that resist low temperature embrittlement sufficiently to perform satisfactorily. For lower temperatures, austenitic stainless steels and nonferrous metals have been employed, but with increased use of low-temperature processes, involving temperatures of minus 100 degrees Fahr. and below, there is a search for less expensive materials.

Results of an effort to find such materials were reported by T. N. Armstrong and A. P. Gagnebin, members of research staff, International Nickel Co. Inc., New York. Based upon results from tests of experimental heats and steel produced commercially, it is concluded that good impact values can be obtained at temperatures down to minus 200 degrees Fahr. with:

1. Properly deoxidized, normalized and drawn cast steel containing a maximum of 0.15 carbon and from 3.5 to 4 per cent nickel, and with cast steels containing a maximum of 0.15 carbon, 2.75 nickel and approximately 0.30 per cent molybenum.

2. Normalized and drawn wrought steels containing a maximum of 0.17 carbon and a minimum of 2.75 per cent nickel. Optimum nickel content in the plain nickel steels appears to be between 3.5 and 4 per cent.

3. Normalized and drawn wrought steels, containing low carbon and substantial quantities of nickel and molybdenum, that have been oxidized with aluminum.

4. Any of the foregoing wrought steels after liquid quenching and drawing and, in addition, higher carbon fine-grained nickel, nickel-molybdenum, and other nickel alloy steels that have been quenched and drawn.

Molybdenum Steel Weld Rod

Providing the soundness of welds can be assured by some nondestructive method such as radiographic inspection, the authors stated, welds made with heavily-coated, low-carbon, 2.5 nickel, 0.20 per cent molybdenum steel electrodes will meet most requirements for impact resistance at temperatures down to minus 150 degrees Fahr. It is probable that welds made with other steels will maintain good impact resistance at temperatures down to minus 100 degrees and slightly below, but it is believed that there are few steels that will give weld deposits possessing the combination of tensile properties and low-temperature impact resistance obtained with the nickel-molybdenum steel.

Effect of titanium on macrostructure and grain coarsening temperature of forging steels was discussed by G. F. Comstock, metallurgist, Titanium Alloy Mfg. Co., Niagara Falls, N. Y. Small ingots of steel containing 0.32 to 0.41 carbon, 0.62 to 0.72 manganese, 0.10 to 0.37 per cent silicon, and low phosphorus and sulphur, were poured at controlled temperatures from induction furnace melts to which aluminum, aluminum plus titanium, or aluminum plus zirconium, were added in various amounts just before pouring.

Ingots were split lengthwise, one half of each being etched by Humfrey's method to show macrostructure; the other half forged to a 1-inch square bar. Samples from this bar were heated 8 hours from 1700 to 1950 degrees Fahr., respectively, and grain sizes determined after heating.

Effect of Titanium

Residual titanium contents of about 0.1 per cent or more, Mr. Comstock related, were found to prevent formation of coarse dendrites, while with similar amounts of aluminum or zirconium but no titanium coarse dendrites were formed. With titanium above 0.2 and aluminum additions of 0.05 to 0.15 per cent, grain coarsening temperature of this steel was found to be above 1950 degrees Fahr.; and titanium contents of 0.10 to 0.12 with aluminum additions of 0.05 to 0.15 per cent gave higher grain coarsening temperatures than were obtained with about 0.1 per cent zirconium or by increasing aluminum addition alone from 0.10 to 0.15 per cent.

The process of surface hardening high speed steel by immersion in a molten cyanide bath is used today to a varying degree by practically every manufacturer of tools and in most instances with considerable benefit to the product. In spite of this, the process has lacked intensive study. Prompted by a desire to gain a working conception, not only of what happens to a tool when it is nitrided but also as to how the process should be manipulated, was made the subject of an extensive

investigation by J. G. Morrison, metallurgist, Landis Machine Co., Waynesboro, Pa., and J. P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa. Their joint paper was intended as an introductory study, since the investigation is being carried further.

The study thus far has been concerned first with characteristics of the bath, and second with material nitrided. The authors discussed under the first heading: Composition of the bath, chemical reactions, aging of the bath, contamination of the bath with particular reference to nickel, and galvanic characteristics of the bath. Considered in the second part were: Nitrogen content of the nitrided surfaces, hardness of the surfaces, microstructure, and nature of surface.

The process as usually conducted consists of immersing the hardened and tempered tool or hardened, tempered and ground tool in an aged molten mixture of sodium cyanide and potassium cyanide. Temperature of salt usually is within range of from 1000 to 1050 degrees Fahr. and time of immersion may be from 5 to 60 minutes or more. This results in an extremely shallow case which has a hardness greatly in excess of that of hardened high speed steel. It was early found that use of freshly prepared mixtures of sodium and potassium cyanide produced tools having brittle edges but when the same mixture was aged for a considerable length of time it produced tools relatively free from harmful brittleness.

To cover some of the main points in the process of manufacture of high speed steel upset forgings that are used for cutting tools and to discuss some of the problems that arise in connection with production of these forgings was the purpose of a paper by W. H. Wills, metallurgical department, Allegheny Ludlum Steel Corp., Dunkirk, N. Y. Concerning himself principally with the 18-4-1 type of high speed steel, the speaker stated that as size of the forgings increases, the problem of uniformity of carbide distribution becomes more difficult.

Forgings Replace Bar Stock

Use of forgings in place of the larger sizes of bar stock is now general among cutting tool manufacturers, although much depends upon type of tool and length or thickness with respect to diameter. Advantage of forgings over bar stock, Mr. Wills asserted, lies in the fact that a more homogeneous structure is possible, resulting in finished tools of greater strength and cutting quality.

An attempt to show that for a given load condition a relationship between short and long-time creep rates can be established with temperature as the variable, was the purpose sought in a paper contributed by J. J. Kanter, research metallurgist, and E. A. Sticha, metallurgical engineer, Crane Co., Chicago. For various theoretical reasons, the authors hold that the temperature variable is a much more fundamental one to study and possibly affords more promise in establishing a reliable long-time short-time correlation than does the load variable into which much more complex influences enter.

Many papers have been presented, it was pointed out, dealing with the subject of short duration tests to serve the purpose of verifying materials for elevated temperature use. It is a serious problem among testing engineers to develop some suitable acceptance tests for materials to be used at elevated temperatures which reliably indicate good creep properties. Obviously, the execution of actual creep tests is such a lengthy and expensive process that as such they cannot serve for acceptance testing purposes.

Structural Stability Stressed

Clark and White have proceeded upon the basis that a relationship exists at a constant temperature between the long and short-time rupture properties of steels, studied with load as the variable. In their paper, Messrs. Kanter and Sticha suggested a correlation from another standpoint which may for some purposes be more convenient. Successful use of the method, it was pointed out, depends primarily on one factor, namely, structural stability of the material over the entire temperature range of test and extrapolation at the stress used.

In development of steels for high-temperature applications it is generally recognized that certain of the carbide-forming elements, such as chromium, molybdenum and vanadium, are the most effective in improving strength characteristics. No systematic investigation has been undertaken to determine the influence of varying additions of these elements and this is particularly true with molybdenum and vanadium. Consequently, such an investigation was undertaken by W. G. Hildorf, chief metallurgical engineer, Timken Roller Bearing Co., Canton, O., in collaboration with C. L. Clark and A. E. White, research engineer and director, respectively, department of engineering research, University of Michigan, Ann Arbor, Mich.

Their report on the investigation presented results obtained from short-time tensile tests at room temperature and 1200 degrees Fahr. from rupture tests at 1200 degrees Fahr. and from a micro-examination of steels for the 5 and 7 per cent chromium types in which the molybdenum content varies from 0.50 to 2.0 per cent and vanadium content from zero to 1 per cent. In all, 21 steels were considered.

The authors showed that, in general, strength characteristics are continuously increased as molybdenum content is varied over the given range while strength characteristics are decreased when vanadium content exceeds a given amount. An explanation for the difference in behavior of these two elements was alvanced on the basis of their microstructures. Consideration likewise was given to the influence of the increase in chromium content from 5 to 7 per cent.

Stress corrosion cracking of the austenitic chromium-nickel steels and its industrial implications were discussed by J. C. Hodge, chief metallurgist, Babcock & Wilcox Co., Barberton, O., and J. L. Miller, associate professor of metallurgy, Armour Institute of Technology, Chicago. A number of service failures of these steels had occurred as result of the formation of localized cracks. Service conditions had not involved repeated or variable stressing and had not necessarily involved materials susceptible to intergranular corrosion. Investigation disclosed that the failures had involved a condition of internal static stress and exposure of the stressed material to certain corrosive media, which in some cases were so inactive that they left ordinary carbon steel unaffected.

Failures Are Stress Corrosion Type

The failures, the authors declared, were identified as being of the stress corrosion type and closely allied to "season cracking" of certain brasses and to the stress corrosion cracking exhibited less frequently in other metals, for example the caustic embrittlement of boiler plate. It was determined that such stress corrosion cracking in the austenitic chromium-nickel steels may manifest itself either as an intercrystalline or as a transcrystalline failure. Factors which include the stress intensity, strength of the corrosive medium and susceptibility of the material to intercrystalline corrosion determine the path of the failure.

Stabilizing elements, such as titanium and columbium, were found to be ineffective in preventing transcrystalline stress corrosion cracking, but intercrystalline susceptibility was absent and a somewhat higher stress value was required. To eliminate the possibility of stress corrosion failure, fabricating stresses must be removed or reduced by an elevated temperature treatment and the material slowly cooled to prevent thermal stressing. The evidence in-

dicates, the authors declared, that even such heat treatment is ineffective when two metals having different coefficients of thermal expansion such as 18-8 and carbon steel, are joined by welding.

Corrosive media capable of producing stress corrosion cracking in the austenitic chromium-nickel steels are limited in number. The mixture of ethyl chloride and water was found to be effective in producing stress corrosion failure. Fabric chloride and mercuric chloride solutions were also found have a damaging effect. Messrs. Hodge and Miller argue that the mechanism of stress corrosion failure is similar to that of corrosion fatigue cracking.

Torsion Impact Test

Torsion impact test can be analyzed by appropriate means and the stress-strain characteristics derived, according to O. V. Greene, metallurgical department, Carpenter Steel Co., Reading, Pa., in a paper prepared by himself and R. D. Stout, instructor in metallurgy, Lehigh university, Bethlehem, Pa. Stress-strain properties of 1.10 per cent carbon tool steel have been calculated by two methods, with reasonable agreement between static and impact tests, with stress-strain curves of torsion impact test clearly showing strength and ductility factors. Elastic limits in torsion have been determined and found to be approximately 60 per cent of breaking strength throughout drawing range used in the authors' work.

In subsequent discussion, Dr. Clark, California Institute of Technology, Pasadena, Calif., mentioned tests on cold-rolled specimens at different velocities similar to the authors' tests. It was brought out the method must be used with utmost caution, taking care that materials are not velccity-sensitive in range used. Dr. A. V. de Forest, Massachusetts Institute of Technology, advised that tension and impact tests should be reconciled. In regard to toughness of tool steels, it was also pointed out a number of them fail not at breaking point but after repeated loadings below breaking point.

Influence of magnetic fields on damping capacity was dealt with by E. R. Parker, General Electric Co., Schenectady, N. Y. Dampening tests were made on two commercial steels in steady and in alternating magnetic fields. Energy loss when a steady field was present was less than half the value for a zero field. An alternating field reduced energy loss to about half obtained in a steady field. Endurance of fatigue specimens was found to be reduced by presence of a steady magnetic field. In discussion, Dr. de Forest spoke of the old and interesting relationship between magnetics and dampening, but emphasized that more is needed to be known both from mechanical and magnetic angles.

Interrelation between stress and strain in the tensile test was discussed by E. J. Janitzky, in a paper by himself and M. Baeyertz, both of Carnegie-Illinois Steel Corp. They presented three empirical equations which express the interrelation, as determined on round specimens with a gage length of 2 inches and a diameter of 0.505-inches. Validity of the equations was demonstrated by experimental data obtained on steels of widely differing chemical compositions and various commercial heat treatments such as annealing, normalizing, and quenching, followed by tempering. Discussion questioned correlation between well-known elongation equation and the authors' results, answer being they follow the same law. Mr. Janitzky questioned the inference that showing of ductility by reduction of area would come to be of growing importance.

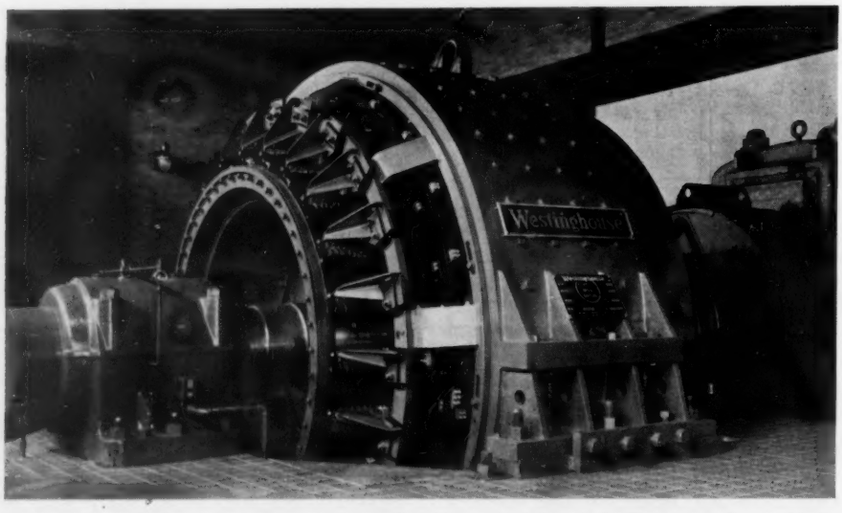
Pickling Reduces Fatigue Limit

Pickling under standard conditions, namely 12 minutes in a 10 per cent by weight aqueous solution of sulphuric acid at 149 degrees Fahr., reduces the fatigue limit of material as received by about 2 per cent, according to G. L. Kehl and C. M. Offenhauer, United States Steel Corp., Kearney, N. J., in a paper read by H. A. Anderson, co-chairman of the session. Presented were results of investigation of fatigue properties of a 0.54 per cent plain carbon steel as affected by prior stressless corrosion in a sulphuric acid pickling bath. Variables investigated included effect of certain inhibitors, time of pickling in both inhibited and uninhibited baths, temperature, acid concentration and ferrous sulphate content of the bath. In discussion, Dr. F. N. Spellor, National Tube Co., indicated steel can be pickled without reducing fatigue limit and stated there were several good acid inhibitors on the market besides those the authors mentioned.

General experience with leaded steels, that is, steels to which small additions of lead have been made to improve machinability, indicates that this material merits a place in the group of steels now available for production purposes. This was the contention of F. J. Robbins and G. R. Caskey, metallurgical engineer, and metallurgist, respectively, Bliss & Laughlin Inc., Harvey, Ill., who reported results of physical and machine tests conducted on several analyses of leaded steels in an effort to estimate the value of this type of steel for industrial uses.

It was pointed out that these

Large Motor Ventilated by Water Cooled Air



■ Claimed to be the largest direct-current machine in Canada, this motor is rated 7000 horsepower, 700 volts, 50 to 100 revolutions per minute and drives the 46-inch reversing blooming mill at the Steel Co. of Canada Ltd., Hamilton, Ont. Because of its low speed, the motor has an armature diameter of 12 feet. Ventilating air is blown into the motor through rear enclosing endbells and discharged into the room at the commutator end. The warm air of the motor room passes through air coolers using cool lake water and recirculating fans and again is directed into rear of motor. Photo courtesy Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

steels present an opportunity for substantial savings in fabrication costs without sacrifice in mechanical dependability. Recognizing that this type of steel is relatively new, the authors said it is to be expected that some of the details of manufacturing procedure have not at times been satisfactorily controlled to develop the best characteristics. Widening of experience doubtless will result in constant improvement in quality and also in a wider field of application.

In evaluating the physical character of the leaded steels, Messrs. Robbins and Caskey compared typical physical tests with average properties of nonleaded steels of similar base chemistry. They also showed comparative service strengths. Results of machine tests were summarized in a machine chart in which performance of each grade of lead-bearing steel was compared directly with the similar standard grade containing no lead. An accompanying table gave suggested tool feeds to be used at the speeds shown in the chart. A detailed report was given of a machine test made on an automatic screw machine fabricating one part from several grades of leaded and nonleaded steels.

Lead Not Well Distributed

Discussing this paper, E. F. Davis, metallurgist, Warner Gear division, Borg-Warner Corp., Muncie, Ind., pointed out that for maximum effectiveness, the lead must be in an extremely fine particle division and evenly distributed. However, he declared, much of the steel on the market has not had the lead reasonably distributed; there have been large segregates and often considerable areas with no lead present. If a machine is speeded up to show a justified economy and some bars have practically no lead in them, the machine produces rough work and has much tool trouble. This is no doubt due to faulty steelmaking, but the buyer is the victim, nevertheless.

Mr. Davis also asserted there is much opposition by the steel industry to manufacture of leaded steels for it is claimed the extra $2 per ton does not pay the cost of additional chipping and difficulties attending incorporation of the lead.

W. H. Swanger, metallurgist, national bureau of standards, Washington, commented that the present paper and previous ones as well have not positively identified the form in which lead is present in the steel and consequently the mechanism by which the observed improvements are obtained has not been explained.

Earlier discussions on the distribution of lead postulated a submicroscopic state of division or emulsification of the lead to account for the lead that was believed not to be visible in the microstructure, Mr. Swanger continued. Apparently, he said, Messrs. Robbins and Caskey, do not subscribe to this theory for they did not mention it. It is possible, therefore, that the lead, through association with sulphide inclusions, increases the effects of the latter in providing free machining qualities. If this association involves formation of lead sulphide, it is to be noted that it would require slightly less than 0.04 per cent sulphur to combine with the usual 0.25 per cent lead in leaded steels.

Lowers Manufacturing Costs

In the opinion of W. E. Bancroft, Pratt & Whitney Co., Hartford, Conn., the authors showed that lead-bearing steels when properly manufactured can be relied upon to lower manufacturing costs on certain jobs without sacrifice in quality. It might have been shown, he stated, that in other cases an improvement in physical properties could be obtained with no sacrifice in manufacturing cost. For instance, addition of lead to S.A.E. 1112 will not lower physical properties, especially ductility, as much as will addition of extra amounts of sulphur.

Comments by the authors on the type of chips formed was interesting and important, Mr. Bancroft said. In most open types of machining, the small well broken up chips are undoubtedly an advantage, as the authors stated, but in tapping a different condition exists. In two or three cases where tapping difficulty was encountered, Mr. Bancroft asserted a solution was effected by changing design of the taps to prevent the small finely divided chips from loading and causing binding.

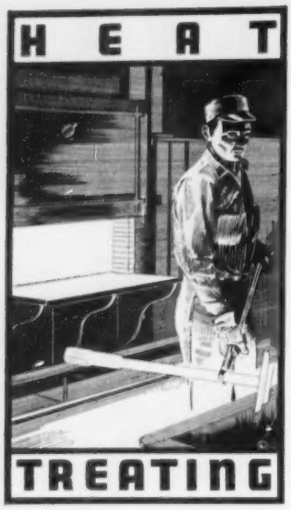
Results of a series of tests showing the relation of physical properties and microstructure to machinability for several logs of cold-finished and heat treated S.A.E. 1045 steel, were reported by O. W. Boston, professor of metal processing, and W. W. Gilbert, assistant professor of metal processing, University of Michigan, Ann Arbor, Mich. The machinability data included the cutting speed-tool life relation, cutting temperatures, cutting forces, and surface quality when dry cutting a test log of each of five structures; the tool life-cutting speed relation when turning the cold finished log with different types of cutting fluids; and surface quality when turning the cold finished log at different speeds.

Effect of time and temperature of annealing and amount of prior cold reduction on the structure and hardness of three commercial low carbon steels when annealed under carefully controlled conditions was reported on by W. P. Wallace, Columbia Steel Co., Torrance, Calif., and R. L. Rickett, United States Steel Corp., Kearny, N. J., with the latter delivering the paper at the Tuesday morning simultaneous session at the Palmer House. A rimmed, a silicon-killed and an aluminum-killed steel, all containing 0.15 per cent carbon or less and all cold reduced various amounts up to 81 per cent reduction in area had been

(*Please turn to Page* 68)

Large Front Bumper Adds to Truck Usefulness

■ **Equipped with a large apron-like front bumper integral with truck frame, this industrial truck operating in a tube plant is able to push and spot as well as pull loads such as this. Bumper also serves as a protector for the truck body. Photo courtesy Towmotor Inc., 1225 East 152nd street, Cleveland**



Double-Lead Patenting

Modern installation features simplified loading of reels so one operator readily handles all loading and unloading operations as well as checking the controls. Variable transmission units permit wide speed range for various wire sizes

■ WORCESTER Wire Works, Worcester, Mass., division of National Standard Co., Niles, Mich., recently installed equipment which results in extremely close control, within plus or minus five degrees Fahr., in the heat treatment of special-purpose wire. The operation is commonly known as the double-lead patenting process and is designed to improve the physical properties of wire as drawn. It is used for treatment of wire for such purposes as musical instruments, textile equipment, aircraft construction and high-strain wire rope where high tensile strength combined with toughness and torsional qualities are necessary requirements.

The patenting department comprises a battery of four furnaces, arranged in parallel, operation of which is identical. Each is equipped with 16 reels and necessary handling equipment at the entrance end and variable speed coilers at the exit. Control and recording instruments are mounted on a large panel board at the end of the room beyond the coiling equipment.

Wire in coils is transported into the department on electric trucks. The reels, arranged in two rows of 8 for each furnace, are of the Swift type and are loaded from the trucks by electric hoists mounted on 2-track spans so either of the two rows of reels may be served readily. Loading is a relatively simple matter since the trucks are merely brought up to the end of the two rows of reels serving each furnace and unloading by a single operator. The operation is so simplified that one man readily handles the wire at both ends of the furnace and checks the controls.

The furnaces, built by Surface Combustion Co., Toledo, O., are arranged in three sections, a preheating chamber, hardening kettle and a quenching kettle.

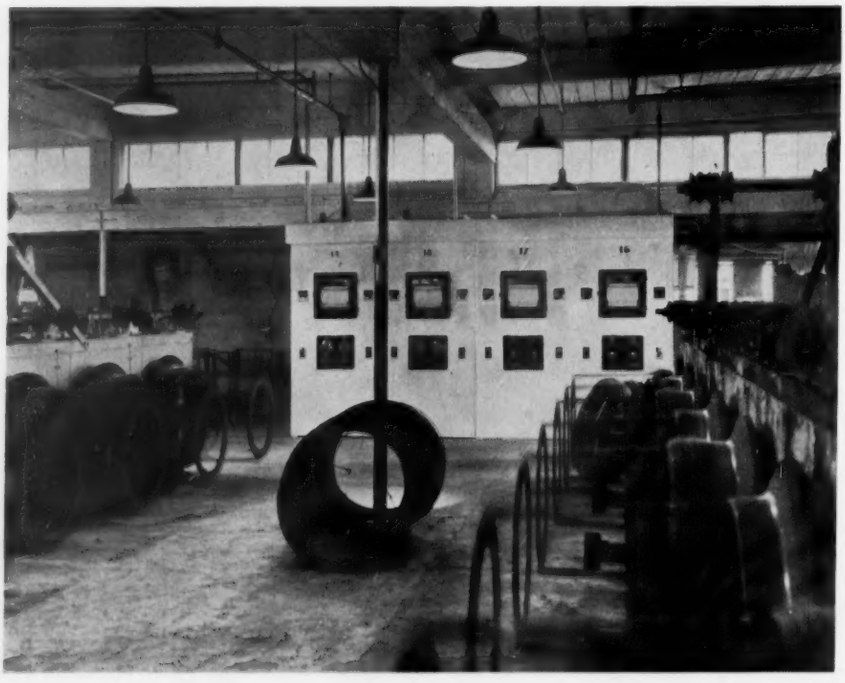
From the reels, the wire first passes through the 6-foot preheating chamber where the wire comes in direct contact with the excess products of combustion. The wire then dips down into the first of a pair of lead immersion kettles with an overall length of 8 feet. Lead baths in both kettles are covered with anthracite rice coal to prevent the lead from sticking and also to prevent oxidation and permit retention of heat.

The first, or hardening kettle, is made of a special grade of chromium-nickel cast iron and provides for a lead bath about 5 inches deep. This kettle is operated at a temperature close to 1625 degrees Fahr. and has a life of about 650 tons of material.

Welded Kettles Used

The wire then passes to the second, or quenching kettle, operated at temperatures ranging from 900 to 1050 degrees Fahr. depending upon the physical specifications required. The quenching bath is about 8 inches deep. In both baths, the wire line is about 2 inches below the surface. Incidentally, it has been found that kettles welded from rolled steel plates are perfectly satisfactory for quenching service.

The hardening kettle is heated by nine gas burners and the quenching kettle by six. However, the full six burners on the quenching kettle are used only during the firing-up period. Ordinarily, two are sufficient since some heat is carried by the wire from the first kettle into the



View between two lines of patenting equipment showing potentiometer recorder controllers on panel. Photo courtesy Foxboro Co., Foxboro, Mass.

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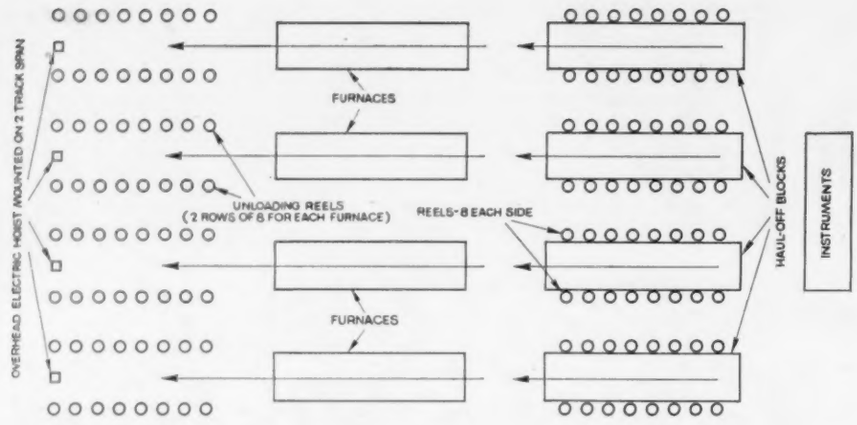


Layout of patenting equipment at plant of Worcester Wire Works, Worcester, Mass.

second. The fuel is anthracite producer gas.

A thermocouple is located at the exit end of the hardening bath in the center and a second thermocouple in the quenching kettle about 1½ feet from the point of first immersion. It has been found advisable to locate the second thermocouple at the side rather than at the center.

A 2-point potentiometer recorder serves each furnace, operating in cycles of 1½ minutes. Burner valve action is controlled by two indicating controllers for each furnace. The controllers and recorders are conveniently mounted on a central panel board for ready inspection by the department head or operators.

As the wire emerges from the quenching kettle it passes upward at an angle of 45 degrees through a header pan also loaded with rice coal, which wipes off the lead and serves to cool the wire slightly.

Production Closely Controlled

The wire then passes on to the take-up or haul-off blocks, speed of which may be varied readily by means of a speed reducer. This reducer may be controlled so production of each furnace can be maintained at precisely 600 pounds per hour, their fixed capacity.

It is evident that considerable variation in speed is necessary in treating wire ranging from 0.072 to 5/16-inch in diameter to maintain the 600-pound per hour rate. As previously noted, each furnace is equipped with 16 reels so any number of wires up to and including 16 may be passed through the furnace simultaneously.

The speed range runs from 8 revolutions per minute down to 1 revolution per 65 seconds. The blocks themselves are driven by constant speed drives. The foreman of the department is responsible at all times for maintaining correct speeds.

The treated wire is removed from the blocks by the individual furnace operators and trucked to the pickling department.

Book on Philippine Mining

■ *Philippine Mining Year Book*, 1939, official publication of chamber of mines of the Philippine Islands, box 769, Manila, P. I., has been issued and now is in its second printing. It covers the history of the various mining districts and leading producers, review of the base metal industry and mining share market and various other phases of the industry.

It is profusely illustrated and contains complete statistics and directories of the companies, the mines, the personnel and the results. The price is $1, postpaid, in the United States.

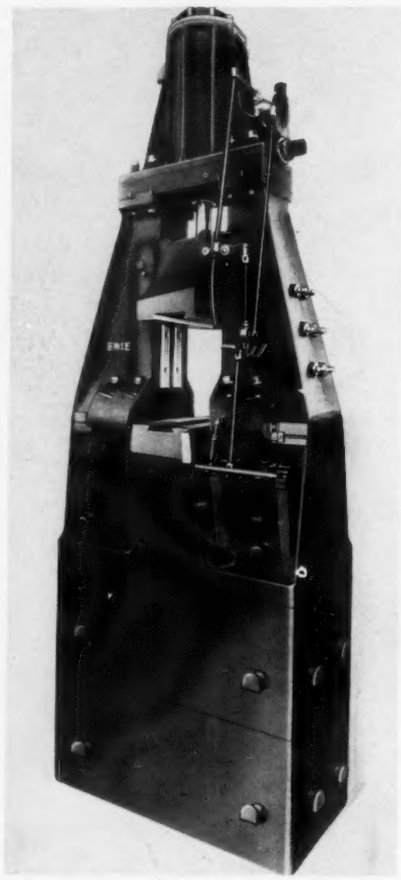
High-Temperature Duty Alloy Steel Sought

■Research is under way at Purdue university, Lafayette, Ind., to find an inexpensive alloy steel which will permit higher pressures and temperatures in steam generating plants than those now regarded as maximum. The test program, sponsored by Engineering Foundation, 29 West Thirty-ninth street, New York, includes measuring the oxidation rate of more than 20 alloy steels in contact with steam at temperatures between 1000 and 1200 degrees Fahr.

Large Drop Hammer

■ A steam drop hammer claimed to be the second largest of its kind in the world has been built by Erie Foundry Co., Erie, Pa., for a manufacturer who will use it in making light metal alloy forgings. The hammer is rated at 35,000 pounds and has ram, rod and piston weighing about 42,000 pounds. In addition, it will handle a top die weighing 10,000 pounds. Total weight of the machine is 880,000 pounds. The anvil, weighing 350 tons, consists of the top section weighing 130 tons and two bottom sections weighing 110 tons each.

Overall height as shown in the accompanying illustration is 40 feet 6 inches; but of this, only 23 feet 6 inches will be above the floor line when the machine is installed. The machine will rest on 3-foot timber mat supported by a 350-ton concrete foundation block. Below this, there is an isolating layer of cork and a reinforced concrete footing to distribute the load on the soil. The construction of the foundation required excavation to the depth of 36 feet.



This 440-ton steam drop hammer has a top die weighing 5 tons and rests on a foundation of iron, timber, cork and reinforced concrete extending 36 feet below the floor line

Dies up to 44 inches wide can be used supported without overhang up to a length of 90 inches. A special construction is employed to permit regular use of the longer dies without angular misalignment.

Destined to Blanket

. . . BUT NOT DRIFT

STEEL's 1940 Yearbook issue, dated January 1, is destined to *blanket* the metalworking industry . . . It's coverage shall be thorough with no ground left uncovered—and the "fall" will be geographically distributed with no deep drifts and barren spots to unbalance the efforts of the advertising pages therein.

Any worthwhile advertising message in this issue is bound to have a receptive audience.

STEEL's

1940 Yearbook Issue

Built-Up Trusses

Steel fabricator obtains 35 per cent cost reduction by using welding to position truss members when fabricating. Saves through requiring fewer templets, reducing number of pieces in layout and by the elimination of subpunching and reaming

By WM. J. DUTHIE*
Seattle

■ IN PLANNING the fabrication of truss members for the United States navy airplane hangar, Sunnyvale, Calif., it was decided to reverse the usual method of fabricating steel bridge and heavy roof trusses as will be detailed. This was accomplished by use of arc welding.

The contract for this hangar was awarded Wallace Bridge & Structural Steel Co. of Seattle on the basis of a riveted design. By the usual method of fabricating steel for bridge trusses, material is cut, punched and assembled. However, subsequent creepage tends more or less to throw the milled joints slightly askew and sometimes requires correction. The revised procedure was for the purpose not only of saving fabricating costs but to permit an additional saving by elimination of the necessity of assembling each truss and matchmarking it in the shop. One truss of each type only was assembled, and resulting fit was so exact that all other trusses were shipped without assembling or matchmarking. This is quite an unusual procedure.

The trusses on which this article is based are transverse, 3-hinged members 14 feet deep. Cord members are built up of one 16-inch I-beam with 15-inch channels at top and bottom and with the usual intermediate cross members and bracing. Trusses were milled accurately from pin connection to pin connection on both top and bottom cord, with 34 cord members to each truss.

As the truss steel was unloaded from cars, the members were sorted onto skids. The correct numbers by mark then were assembled in position and the 16-inch I-beams arc welded to the 15-inch channels with 3-inch welds on 18-inch centers staggered as shown in accompanying sketch. Each section thus was assembled into a complete built-up member ready for the usual fabricating operations involved in riveted construction.

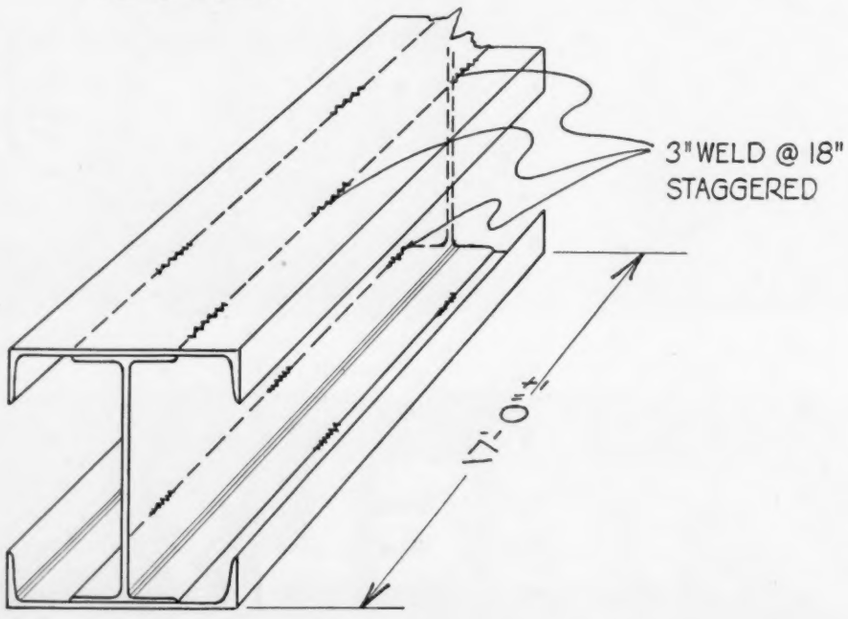
After the welding operation, each cord was moved to the milling machines and milled accurately to templet. This gave a cord completely assembled and of exact length and angle.

After milling, all brackets were tack welded to the members, rivet holes were laid out and drilled through the complete arc-welded members, which then were ready for riveting to complete the cord fabrication.

It is apparent that great savings were accomplished in the shop fabrication by arc welding the different members. A similar saving was obtained in erection of the trusses into the structure.

As the different members were unloaded at the job site, it was only necessary to keep members of the same mark and location together. Then as each truss was erected, the top member of each pile was taken and placed in position. This eliminated sorting and

Diagram showing how members of trusses were tackwelded prior to fabricating operations



*Former plant manager, Wallace Bridge & Structural Steel Co., Seattle.

Abstract from paper receiving award in structural building classification of $200,000 Program sponsored by James F. Lincoln Arc Welding Foundation, Cleveland.

turning over material to get the proper member for a given truss, permitting an appreciable saving in time and handling of material, which is one of the principal items in any erection job.

The trusses were erected on A-frames approximately 54 feet in height. The trusses are 194 feet in height including A-frames and have a span of 264 feet. It is emphasized that all cords, both top and bottom, were milled accurately to the proper angle and made a perfect butt joint at each connection before any holes were laid out for riveting.

Main dimensions of the Sunnyvale hangar include a length of 1200 feet, width of 308 feet and height of 225 feet, with inside clearance 250 feet wide and 205 feet high. This is said to be the largest building in the world without interior posts or columns. It has an unobstructed floor area of 300,000 square feet and required 8400 tons of structural steel.

Tack Welding Before Drilling

Owing to the unusual dimensions of this structure and the simplified method of fabrication plus erection, it is believed this structure demonstrates feasibility of the use of arc welding even on structures designed for riveting. As a matter of fact, this method of assembly has been carried by this company into the fabrication of large plate girders where all members were tack welded together and drilled through the assembled unit. Accompanying illustration shows the simplicity of such an arrangement.

Detailed comparison of the estimated cost and actual cost of the Sunnyvale structure is as follows: Cost of templets was estimated at 15 cents per hundred pounds of material. The actual cost amounted to 10 cents, a 33 1/3 per cent saving due to the reduced number of templets required.

Layout costs estimated at 15 cents per hundred pounds actually amounted to only 11 cents, due to the fewer number of pieces involved. Fabrication costs estimated at 30 cents per hundred pounds totaled only 20 cents due to the elimination of subpunching. Since it was possible to drill all members full size, reaming was eliminated. Also, an important saving was realized in assembly work, which had been estimated to cost 40 cents per hundred pounds and which actually cost only 25 cents. This saving was due to practically no bolting up being required. All holes were true with no warped members, thus greatly facilitating assembly work.

Shop erection to correct milled joints, ream subpunched holes and insure fit on the job had been estimated to cost 25 cents per hundred pounds, but since the work was found to be so extremely accurate it was only necessary to assemble one truss of each type, which made actual cost only 15 cents per hundred pounds, a 40 per cent saving.

Totaling estimated costs against actual costs, it was found that a saving of 44 cents per hundred pounds, the difference between $1.25 estimated and $0.81 actual cost was produced. This amounts to a saving in cost of 35.2 per cent on this portion of the job.

Considering overhead, it is estimated that more than 35 per cent over previous methods of fabrication of steel trusses or bridge cords of similar design was made. The saving in erection costs, which is considerable, is not included in this estimate.

The procedure described provides increased service life because cords and other members are assembled without warping or strain in the members themselves. Also, the welding material used increases the safety factor, adding the equivalent of 15 to 20 rivets without reducing the area by punching holes.

Increased efficiency and general economy obtained throughout the entire fabrication amounts to considerable in addition to the reduced cost of 35 per cent which does not include the saving in erection cost which also accrues. Another important fact is that the members are assembled into a unit and checked before further fabrication.

While the 760 tons involved here was only a small portion of the total, 8400 tons, the savings are sizable and the possibilities of development are important. In bridges, for instance, the points where posts and diagonals enter cords have been troublesome. For light roof trusses and structures, a light channel might be developed which could act as a firm base to assemble minor members against, in place of the small angles generally used. The channels would keep the assembly in position and prevent warping and twisting. The future use of built-up members as described here may bring forth important developments.

Welding Engineers Are Presented With Enlarged Technical Program

■ FEATURING some 58 technical papers, the sessions of the twentieth annual meeting and exposition of the American Welding society held in Chicago, Oct. 22-29, 1939, as part of the National Metals congress and exposition covered a greatly enlarged field. Abstracts of a portion of the papers are presented here with others in next week's issue of STEEL.

Within the past two years, welding has been utilized by the navy on a large scale, according to Commander C. A. Trexel, United States navy. With adoption of standard specifications, welding was utilized on many naval structures ashore, such as the large airship hangar at Sunnyvale, Cal., where over 7 miles of seam welding are employed on the deck plates of the mezzanine floor. Other structures of welded construction include bridge cranes, mooring masts, ocean piers, and many rigid frame structures. The mess hall at the United States naval academy, Annapolis, Md., for instance, has clear arch spans of 75 feet. Other rigid frame buildings are being constructed with spans of 100 feet and more. Additional uses of welding include power plant piping, radio towers and repair work.

Several interesting applications of welding at the Bonneville dam were detailed in a paper by Paul L. Heslop, and Fred T. Downing, both of United States Army Engineers, Bonneville, Ore. Welding applications here were of interest because of the huge stresses and size of the fabrications, which included such items as turbines, generators, cable drum and truck frame for 350-ton crane, structural frame for 30-ton gantry crane, also welding was employed to fasten embedded gate guides to reinforcing steel during alignment. This was of interest because of the extremely close tolerances necessary to hold alignment.

Description of weld-hardening studies was presented by H. J. French and T. N. Armstrong, both with International Nickel Co. Inc., 67 Wall street, New York. These showed that in carbon steel as well as a variety of pearlitic alloy steels, weld hardness depended not only upon the metallurgical characteristics of the steel being welded but also on many variables associated with the welding technique and upon the dimensions of the parts.

Therefore, tests for weld hardening must be made under exactly the conditions to be encountered in practice to be of value.

Of all the factors, carbon content is most potent in determining maximum hardness. However, the hardening tendency, a function of many variables, determines how close to maximum hardness is approached.

In an investigation of the spot welding of automobile grade mild steel by W. F. Hess and R. A. Wyant, Rensselaer Polytechnic institute, Troy, N. Y., single spot lap welds were obtained having a tensile shear strength of 1100 pounds when using ¼-inch flat welding tips and an electrode pressure of 15,000 pounds per square inch, optimum pressure for this material as both 10,000 and 20,000 pounds were less satisfactory.

Other optimum conditions here included 12,500 amperes for 6-cycle welds and 11,000 amperes for 12-cycle welds. Times between six and twelve cycles were best for this work. A pressure dwell period of at least 5 cycles was considered necessary.

In seeking information on which to base specifications governing the design of welded structural members subjected to reversed or pulsating stresses, W. M. Wilson and A. B. Wilder, University of Illinois, Urbana, Ill., made many tests. They found removing the stress raiser due to change in section (done by machining projecting weld metal off flush with base plate) raised the fatigue strength 43 per cent. Moreover, the fatigue strength of welded specimens with the reinforcing planed off was equal to that of plates without welds.

Stress Relieving

Stress relieving at 1200 degrees Fahr. for one hour, followed by furnace cooling, had no effect upon their fatigue strength. Regardless of reinforcing or stress relieving, fatigue strength corresponding to failure at 2,000,000 cycles exceeded yield point of the material. Therefore this factor is not important to the structural designer.

Description of a continuous forming and welding line for manufacturing propellor shaft tubing was presented by G. C. Gridley, Mechanics Universal Joint division, Borg-Warner Corp., Rockford, Ill.

Brazed joints in aluminum alloys made by methods described by G. O. Hoglund, Aluminum Co. of America, New Kensington, Pa., are claimed to have the characteristics of a welded, not a soldered, aluminum joint. The process has aroused considerable interest because of the low cost of batch brazing.

An increase in the graphite content of the coating for arc welding electrodes normally results in an increase in carbon content of the deposit, according to work done by R. D. Thomas Jr., Arcos Corp., 701 North Broad street, Philadelphia, and F. H. Rhodes, Cornell university, Ithaca, N. Y. With electrodes of too low carbon content, the deposit carries appreciable amounts of oxide inclusions, however. So a balance must be found.

High percentages of graphite in the coating resulted in more silicon being carried into the weld metal, with manganese content increasing slightly and amount of iron oxidized diminishing. Practically all of the titanium and aluminum oxides in the coating reappear in the slag.

Crater Formation

Crater formation in arc welding, as reported by G. E. Doan, Lehigh university, Bethlehem, Pa., and M. C. Smith, University of Alaska, College, Alaska, depends primarily upon the presence of oxygen in the arc atmosphere. Indications from their most recent work indicate that reduction of metallic surface tension by suitable alloying additions favors crater formation. Use of a diatomic gas as an arc atmosphere similarly favors crater formation. However, these effects are not sufficient to produce cratering in the complete absence of oxygen, although each lowers the percentage of oxygen required to cause crater formation.

Studies of the alloying effect of deposited metal with molten base metal in single and multiple pass metallic arc welding were detailed by R. W. Emerson, Westinghouse Research Laboratories, East Pittsburgh, Pa. He concluded that since low carbon and high alloy stable austenitic steels are not affected adversely physically by welding heat, the only consideration is effect of alloying which can be eliminated simply by using an electrode of approximately the same chemical analysis as the base metal being welded.

Where it is necessary to weld low carbon or relatively low alloy steel (0.5 to 4 per cent special element) with austenitic electrodes, it is desirable to use an electrode in which the austenite is sufficiently stabilized so that after dilution with the low carbon or low alloy steel it will still remain as stable austenite and not revert to martensite. Use of 25-12 or 25-20 chromium-nickel electrodes is believed preferable to 18-8 for work of this nature.

Valuable information on use of steel castings in welded fabrications was presented by H. J. Shiffli and E. L. Krejci, American Steel Foundries, at East Chicago and Hammond, Ind., respectively. By use of proper material or suitable combination of materials, a balanced structure can be designed and built which will best serve the purpose, at the same time permitting important economies.

Inefficiencies due to lack of knowledge of best welding practice, best welding machinery, best welding materials and layout were cited by W. W. Petry, Cincinnati Milling Machine Co., Cincinnati, as determining profit or loss. He especially emphasized the importance of proper flow of materials in production welding.

Cold rolling as a test for welds reveals insufficient penetration better than other tests, according to R. L. Dowdell and T. P. Hughes, University of Minnesota, Minneapolis, Minn. Also it is cheaper as special test bars are not required. The method is claimed faster and more satisfactory in convincing operators of faulty technique.

A series of tests by A. P. Young, Michigan College of Mining and Technology, Houghton, Mich., revealed high voltages essential for best results when welding copper, especially where copper backing bars are used. A special bar should be used to blank the under side of the double Vee when the first pass is made on the plate. A high-tin phosphor bronze rod works best. A graphite electrode should be used in preference to the hard carbon type because better quality welds may be expected when welding by the long carbon arc process.

Flame Hardening

In flame hardening, the progressive spinning method is the most practical from the standpoint of the commercial heat treater, said W. G. Hamilton, president, Accurate Steel Treating Co., 2226 West Hubbard avenue, Chicago. It is flexible and minimizes the amount of special equipment required, such as torches and tips, with resulting economies. This method is used for hardening flat surfaces on machine parts, cam shapes for many kinds of machinery, spur, bevel and spiral gear teeth, cylindrical shapes, plungers, bushings and the like. Degree of hardness obtained is determined largely by the carbon content of the metal, the mass of metal beneath the hardened surface and the quenching means employed. In some cases no quenching is required other than the chilling effect of the cold metal mass. By the progressive spinning method great uniformity characterized the depth of the hardened surface.

In flame hardening gear teeth of the higher alloys, neighboring areas are cooled, as quenching these steels with water invariably produces

small surface checks. Therefore, the stream of water is directed on the adjacent teeth only. No such trouble is experienced with straight carbon and a number of other alloy steels. Mr. Hamilton made it clear that experience counts for a good deal in the results obtained with flame hardening.

Great advances have been made in hard facing by fusion welding, it was shown in a paper by T. B. Jefferson, associate mechanical engineer, machine design division, office of chief of engineers, United States army, Washington. This summed up and described the characteristics of ferrous alloy, nonferrous alloy and diamond substitute materials. It was brought out in the paper and in subsequent discussion that the right hard facing material can be selected in many instances only after careful testing and research work. This is necessary so that the material selected will have the service requirements and also so that it will have a satisfactory coefficient of expansion as compared with the base metal.

Flame Treating

Under the head "Flame Treating," J. H. Zimmerman, development engineer, The Linde Air Products Co., 30 East Forty-second street, New York, summed up rather completely the range of applications of the flame hardening process and the materials to which it may be applied. He discussed the usefulness of flame softening, particularly in making flame cut edges machinable, this process has wide potentialities. He also discussed the newest flame treating process, flame strengthening, used to strengthen highly stressed parts locally in the regions of excessive concentrations of stress, thus offering resistance to failure by fatigue. Now in its infancy, this process is regarded as having a bright future.

Fred C. Dull, The Monarch Machine Tool Co., Sidney, O., described this company's technique in flame hardening the way surfaces of lathes, subsequently finishing them by grinding.

Details of highly refined precision welding of small parts the projection welding method were presented by C. J. Oswald, E. J. Bates and R. L. Hous of National Cash Register Co., Dayton, O. Interlocking of controls and improved fixtures are important in obtaining the excellent results mentioned.

In subsequent discussion, improvements in welding current measurement were deemed important in aiding better work as usual method of measuring primary current and applying turns ratio is little more than an estimate. Laboratory method is to use a manganin shunt and measure voltage drop across it with an electromagnetic oscillograph. Ordinary portable open ring type instruments give readings fairly accurate down to 3 cycles but most often measure under steady-current conditions.

Another widely used method is to use a regular current transformer, suitably calibrated, and with a pusher needle on the ammeter to preset indicator needle near actual value. A new development that may be of importance is a new type current transformer designed to fit over the welding electrodes.

Seam Welding Discussed

Defining seam welding as production of a lineal weld on two lapped pieces between two roller electrodes, E. A. Mallett, Taylor-Winfield Corp., Warren, O., detailed various types of seams and their applications. Not so widely known is the mash seam weld made between wide faced wheels with sheets being welded slightly overlapped, forging the weld down to about 25 per cent over the thickness of a single sheet. The intermittent weld reduces buckling on thin sheets.

General conditions required for good seam welds were named as: Having good clean surfaces, some sheets require grinding. Hot rolled sheets have not been seam welded successfully. All coated stocks must be investigated individually. Second, having parts formed and fitted. This factor is especially important as the machine must not be called upon to correct poorly fitted pieces.

Spot tack welding prior to seam welding was recommended unless proper clamping fixtures were available . . . Many types of seam welders were described and their application detailed.

Eight to twelve spots per inch were mentioned as most practical spacing, this measure producing a gas tight seam if other factors are controlled properly. Speeds from 2 to 12 feet per minute are most common. Difficulty of manually guiding the work is the limiting factor in most cases. Some applications as high as 60 feet per minute have been found practical.

Where nature of work requires low speeds burning is liable to result. Use of an interrupter to break up continuous welding current permits reducing minimum speed to one-fourth and so is employed on many applications. Use of a proper timer avoids burning at the low speeds necessary for handling the material in the machine.

Off and on periods should approximately equal each other for best results. This does not necessary hold for coated stock, however. Electronic timers were recommended for maximum accuracy and uniformity of welds.

Dynamic Welding Pressure

Welding pressure, so highly important on all resistance welding, is not the static pressure but the dynamic pressure as the electrodes follow through, it was emphasized by Mr. Mallett. Dynamic pressure is what determines whether weld will be good or bad. In turn, this factor is determined by type of pressure medium, inertia of moving parts and pressure medium, friction, strength of the material at various temperatures and reaction or "jump" of current carrying members.

Those metals with a narrow plastic range greatly accentuate the difficulties involved in the difference between static and dynamic pressures.

Often current required for a job can be reduced to a value within the

Stainless Steel Fan Guard For Electric Motor

■ **Expanded stainless steel sheet now is being used over the inlet air opening of fan guards on fan-cooled electric motors which operate in presence of moisture or corrosive gases. Photo courtesy American Rolling Mill Co., Middletown, O.**

limits of the machine by lengthening the "on" period or shortening the "off" portion of the cycle—same number of welds per inch—thus permitting satisfactory welds to be produced on a machine not exactly suited to the job.

It was stated that resistance welding machines would shortly be rated in secondary amperes and duty cycles and not in kilovolt-amperes as at present. The first more accurately denotes conditions encountered, the latter having little direct connection.

Projection welding is the method most suited to production resistance welding, according to L. H. Frost, Taylor-Winfield Corp., Warren, O., because the pots at which the weld is made are definitely located by the formed part. The method gives high speed as up to three dozen spots can be welded simultaneously. The method produces dependable, consistent welds, he said. While there are many types and sizes of projections, the button type appears best for general work.

Data on strength of projection welds, while not now available, is being developed. This fundamental work was deemed especially important.

It was mentioned that certain types of metals can be projection welded whereas other methods are not satisfactory. The reason is that heat is concentrated at point of weld and not developed on outside surfaces.

Of the causes of trouble in projection welding, nonuniform height of projections is the most important. This height should be checked periodically as material comes from the punch press and should be within 0.002-inch. Proper water cooling of dies is equally important.

It was emphasized in the discussion that followed that dies should be dressed on a periodic schedule and not after poor welds had occurred. This also reduced die costs materially in one plant.

Seeking to determine the dynamic effect of the current tending to force the dies open, on one job using 70,000 amperes die pressure was reduced until the kick opened them. The pressure was 1000 pounds, showing the force was in excess of this amount.

(To be concluded next week)

All-Welded Construction Used On Large Open-Hearth Ladle

■ AN ALL-WELDED open-hearth ladle built by Blaw-Knox Co., Farmers Bank Building, Pittsburgh, for Tennessee Coal, Iron & Railroad Co.'s Ensley, Ala., plant, has a capacity of 140 net tons and weighs 39,250 pounds without the lining. The inside major axis measures 11 feet 3¾ inches at the top and 10 feet at the bottom. Inside depth of ladle is 11 feet 2¼ inches and distance from trunnion center to center is 12 feet 4 inches.

All-welded construction applied to open-hearth ladles reduces weight and increases crane payload

Trunnions and reinforcement members also are all-welded. Trunnions proper are 12-inch diameter solid forgings with a 16½-inch square shank extending through and welded to the ladle shell. A system of vertical and horizontal ribs is welded to the trunnion shank and outside face of shell. Two heavy stabilizing rings 4½ inches thick girdle the ladle. The top ring is 6½ inches wide and the bottom ring, because of the taper in the shell, is 9 inches wide. Plate of uniform thickness is used for the shell.

This type construction ties together the shell, trunnions and stabilizing rings to carry the load. The rings themselves are not expected to resist the torsional moment in pouring since all members are welded together and act as a unit. Since it is almost impossible for a flat bottom ladle to retain its shape without excessive reinforcement, the new ladle was made with a dished bottom to better withstand the loads imposed on it. The bottom is buttwelded to the shell. To reduce the possibility of severe localized stresses, ladle has no abrupt changes of section. The design of the ladle as a whole is intended to lengthen considerably the life of the lining and the ladle.

♦

Tin And Its Uses

■ The results of technical researches on tin, with special reference to their application to industry are summarized in the first number of a new Quarterly Review published by International Tin Research and Development Council, Fraser road, Greenford, Middlesex, England, in the United States, Battelle Memorial Institute, 505 King avenue, Columbus, O. Major changes in methods of production, and application of modern plant for cold reduction of steel and continuous tinning of wide strip are reviewed. Use of canned foods as emergency stores is also discussed. Copies may be had free of charge from publishers.

Aluminum Alloy Bearing

■ A new aluminum alloy automotive bearing with long life, simple construction and high fatigue strength has been developed by Aluminum Co. of America, Gulf building, Pittsburgh. The bearing is used in main, connecting-rod and cam-shaft bearings of truck, tractor, diesel and airplane engines and is expected to extend to passenger cars.

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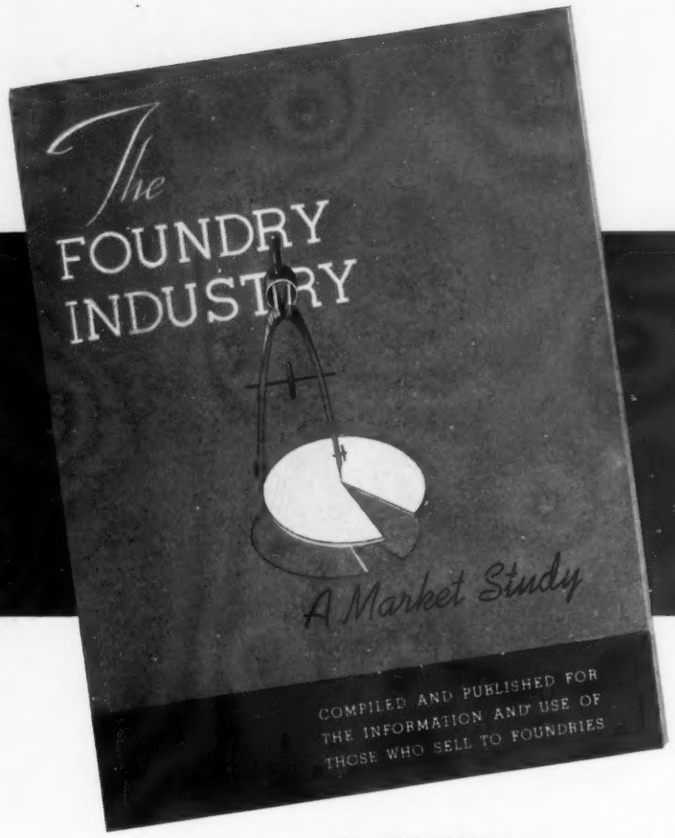

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Metals Institute Studies Die Casting, Brass and Bronze

■ A PAPER on plunger-type die casting machines was presented at the opening session of the Institute of Metals division of the A.I.M.E. held Monday, Oct. 23, 1939, at the Blackstone hotel, Chicago. According to Gerald Edmunds, research division, New Jersey Zinc Co., Palmerton, N. J., co-author with E. A Anderson and C. W. Siller of the same firm, successful operation of the plunger-type die casting machines requires presence of a certain percentage of aluminum in zinc alloys. Tests of various materials for plungers and bushings of die casting machines show this definitely along with commercial die casting in which all zinc alloys employed contain 4 per cent aluminum.

Data presented were concerned only with reactions between three gray cast irons from different foundries, a nickel-cast iron, wrought iron zinc-base alloys and nitrided nitri-cast iron and cast stainless steel. In the 4 per cent aluminum-zinc alloy only the stainless steel and nitrided nitri-cast iron showed no attack or reaction. Gray cast iron revealed formation of zinc-iron compounds while nickel cast iron indicated penetration of zinc along the graphite flakes. The authors pointed out, however, that so many other factors enter into commercial practice that gray cast iron cannot be concluded to be superior to nickel cast iron.

Malleable Cast Iron Suggested

In discussing the paper Bert E. Sandell, Stewart Die Casting Co., Chicago, suggested malleable cast iron might serve since it does not contain flake graphite. He also stated that cast straight 18 per cent chromium steel had given good service in plungers and bushings. E. W. Engel, Carboloy Co., Detroit, said hard metal carbides were inert to zinc base alloys, as was molybdenum metal. Those materials also withstand erosion and corrosion. However, their high cost tended to limit the application to small size plungers and bushings.

George P. Hallowell, H. Kramer & Co., Chicago, asked about application of calorized (aluminum impregnated) coatings, chromium plating, etc. Mr. Sandell stated that while chromium plate works suitably on dies, it tends to spall off on plungers and bushings. Mr. Edmunds said chromium is soluble in zinc-base alloys under many conditions.

In a second paper at the session A. U. Seybolt, co-author with Bruce W. Gonser, Battelle Memorial Institute, Columbus, O., stated that since no low cost, low melting point brass for die casting is available, it became necessary to seek means of increasing the mechanical properties to meet certain requirements. Investigation indicated a silicon-brass containing 83 per cent copper, 5 per cent silicon, 10 per cent zinc, and 1 per cent each of manganese and aluminum possessed excellent physical properties and economy combined with a low melting range. Strength and ductility may be varied by altering the amounts of manganese and aluminum.

Alpha-Beta Structure

Written discussion by Dr. C. H. Samans, Penn State college, State College, Pa., suggested the possibility of an alpha-beta structure in the particular composition employed, and said that reduction of silicon with increase of copper would eliminate it. Mr. Gonser replied that further microscopical examination of some specimens did not indicate a two-phase structure although the work was not conclusive. George P. Hallowell said he had been able to obtain similar physical properties with a 60 per cent copper, 40 per cent zinc alloy with 1 per cent each of aluminum and manganese, and about 0.5 per cent silicon. He asked why that couldn't be used. Mr. Gonser replied the copper-silicon alloy had a considerably lower melting point.

At the second session of the Institute of Metals division held Monday afternoon, A. S. Doty, co-author with F. R. Hensel and E. I. Larsen, P. R. Mallory & Co., Inc., Indianapolis, Ind., described the beneficial effect of 0.25 per cent additions of zirconium on nickel-silicon bronze. The additions remove a dark constituent along the grain boundaries and improve the physical properties. G. F. Comstock, Titanium Alloys Mfg. Co., Niagara Falls, N. Y., asked how the zirconium was introduced. Mr. Doty replied the zirconium was in form of a Cu-Zr concentrate containing either 12 or 35 per cent zirconium and added just prior to pouring the melt at 2300 to 2400 degrees Fahr. About 60 to 70 per cent recovery was obtained.

A. U. Seybolt mentioned that with wrought nickel-silicon alloys, zirconium decreased grain size in recrystallization, but that recrystallization did not occur with casting only. M. G. Corson, New York, said he believed the black constituent observed by the authors was silicon dioxide present as a mineral constituent. C. O. Thieme, H. Kramer & Co., Chicago, asked how the alloy was deoxidized. The answer was that the copper was deoxidized with 4 ounces of 10 per cent copper-silicon per 100 pounds of metal prior to the addition of nickel and silicon to the bronze. Suggestion was made that since zirconium is a powerful deoxidizer and degasifier, it carried those reactions farther than with regular procedure, and hence improved the physical properties.

Session closed with presentation of two correlated papers on distribution of structural and physical characteristics in red brass and gun metal by A. M. Rahm, and A. A. Bradd, research associates in engineering, College of the City of New York. Data obtained indicate that solidification phenomena depend upon physiochemical situations uniformly and symmetrically distributed over a given level in the mold. Density of castings is an important factor but not the only one. High strength always is associated with high density, but the converse is not always true. Hence all factors must be understood and controlled. Grain size has little if any effect on characteristics. Microstructural studies ordinarily are too local to give any indication, and inverse segregation seems to be a frequent phenomenon and is actually more common than normal segregation.

Inverse Segregation Discussed

In discussing the papers M. G. Corson said that in his opinion, inverse segregation was due to a temperature gradient which was low at sand interface and high in the slowly cooling interior. Hence, the tin tends to flow in greater amounts to equalize the difference in vapor pressure caused by the difference in temperature. Sam Tour, Lucius Pitkin Inc., New York, pointed out that so many factors enter into the production of sound castings that one must be careful in attributing certain physical properties to any particular alloy. These include melting, pouring, composition variations, etc. Not all foundries watch those phases carefully and, as might be expected, similar properties cannot be obtained in castings from all foundries.

Increase in amount of carbide present with increasing amounts of cold-work suggests work-hardening of 18-8 may not be due entirely to the formation of ferrite but also to the formation of carbide, it was brought out by R. Buehl, H. Hollomon and John Wulff, Massachusetts Institute of Technology, in a paper presented by the latter at the Monday afternoon session of A.I.M.E. iron and steel division, Blackstone

hotel. This possibility, it was pointed out, shed light on the work of other investigators who had found 18-8 rolled at various temperatures from 20 to 470 degrees centigrade had the same hardness as cold-rolled material and the fact that above 150 degrees centigrade practically no ferrite is formed during working.

In a paper by H. K. Work and H. T. Clark, Jones & Laughlin Steel Corp., the latter described the Carbanalyzer, a new instrument for the rapid and magnetic determination of carbon in a steel bath. Instrument originally was developed for pilot furnace in the Jones and Laughlin laboratory, but now is used in the open-hearth shops. Tests have showed it sufficiently accurate to fill a need of the steel industry. It was cited as comparatively inexpensive, requires little upkeep, and is portable, the latter fact being emphasized in subsequent discussion, as it is self-contained and operates by battery. Temperature changes cause the current to change slightly but instrument is in correct calibration as soon as the current has been set at correct value. Accuracy on a single sample is good; average of three or more samples is highly accurate. In answer to how long it took to make a test, Mr. Clark estimated less than five minutes. Samples used should be "sound," he also added.

Behavior of Slags

An apparatus for determining thermomagnetic behavior of slags and some preliminary results obtained with it was discussed by B. A. Rogers and K. O. Stamm, metallurgical division, bureau of mines, in a paper presented by the former. Fundamental principles were previously employed by Curie and others but construction involved new features. Frantz magnet with isodynamic field was used for supplying the nonuniform magnetic field. Determinations of force on the sample with a magnetic balance were found to be rapid and convenient and accurate as desired. Furnace used for heating could be operated up to 900 degrees centigrade. Use of the apparatus was illustrated by measurements on iron oxides.

Solubility of nitrogen increases from 0.041 per cent in pure iron to a maximum of 0.046 per cent in iron containing between 1 and 2 per cent silicon, and then decreases to about 0.01 per cent in iron containing around 16 per cent silicon according to an investigation by J. C. Vaughan Jr., Union Carbide & Carbon research laboratories, Niagara Falls, N. Y., and John Chipman, Massachusetts Institute of Technology, Cambridge, Mass., and discussed at the Tuesday morning session of the Iron and Steel division of A.I.M.E. Results indicate formation of iron nitride and iron silicide in solution and silicon nitride of limited solubility in the melt.

In reply to a question it was stated that no investigation was made to determine microscopically the particular form of the nitrides present, but it was known that the amount of iron nitride was low. It also was stated that test pieces with low silicon content were quite porous after absorption of nitrogen, but porosity decreased as silicon increased until at higher concentrations the pieces were solid. Another speaker pointed out that iron nitride needles could be found on the extreme outer surface of iron which had been subjected to nitrogen absorption, but hold for some time at a constant elevated temperature would remove them.

Tin and Zinc Coatings

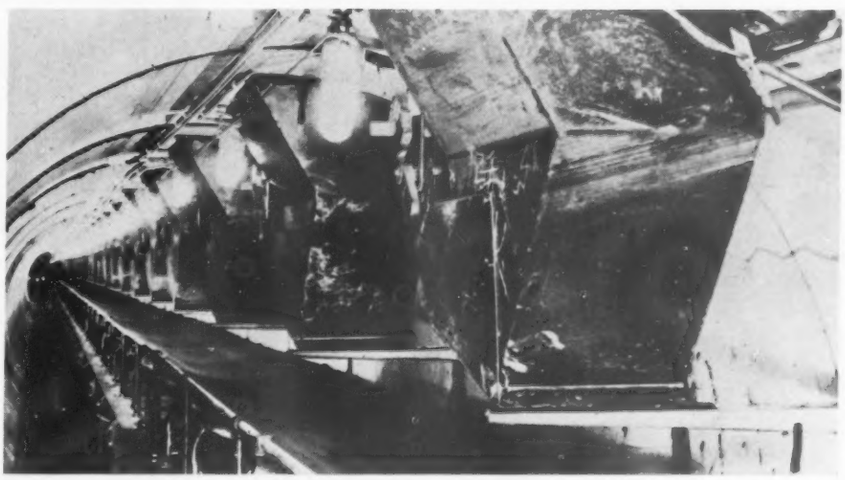
Second paper presented dealt with methods and procedure for metallographic examination of tin and zinc coatings on steel, and was presented by O. E. Romig, co-author with D. H. Rowland, Carnegie-Illinois Steel Corp., Pittsburgh. Interesting phase of the description was use of tough cellophane on the tin and zinc surfaces which permitted obtaining a perfectly plane surface without corner rounding occurring. That is particularly valuable especially with the extremely thin coatings of tin employed in commercial work.

Responding to a question on whether plating was required to preserve the sharp edges desired in examination of galvanized coatings, Mr. Rowland said it was unnecessary. He also pointed out that the procedure wes developed to show the extent of different structures formed from the steel to the pure coating, and not to identify the particular compounds involved. Mr. Rowland said that he believed that use of an etchant containing hydrochloric acid and iodine would color the various metallic and intermetallic phases so that they would be identified, if that was desired. In reply to a question on use of polarized light, it was stated no differences in appearance could be observed as compared with usual microscopic lighting of specimens. One speaker recommended the use of a rubber coated cotton cloth for polishing specimens, the rubber side being placed next to the holding disk.

High efficiency in desulphurization of pig iron by use of calcium carbide and salt was shown in a paper presented by C. E. Wood, co-author with E. P. Barrett and W. F. Holbrook, U. S. bureau of mines, Minneapolis, at the Tuesday afternoon session. Maximum sulphur extraction was 93.5 per cent on an iron containing 0.092 per cent while other tests indicated extractions from 52 per cent up depending on amount of carbide used, and length of time of reaction. However, to obtain the best efficiency it is necessary to use finely divided carbide, and use mechanical means to secure close contact with the metal.

In answer to a question from the floor as to the applicability of the

Underground Coal Conveyor Aids Boat Unloading



After coal has been unloaded from boats into the dock storage piles of a large midwestern coal company, it flows by gravity through chutes to this underground belt conveyor running the length of a 1250-foot tunnel 8 feet below the water line of the adjoining river. Belt conveys the coal to end of dock where it is discharged into an elevator and carried up into a bin screening plant for sizing and grading. Installation, made by Chain Belt Co., 1644 West Bruce street, Milwaukee, is said to reclaim coal from storage with less handling and breakage

method to 30-ton and upward ladles of pig iron, Mr. Holbrook stated that there is no danger from explosive reaction or violent agitation as has been commonly assumed. He also pointed out that the dross or reaction product of desulphurization with carbide does not form a liquid slag but rather a dry crust, or solid product. Use of carbide desulphurization in blast furnace practice would necessitate use of a teapot type or bottom pour ladle which would permit pouring the metal without removal of the dross until the end.

Advantages of the use of carbide are that although it is higher in cost than other desulphurizing agents, it has considerably less effect on lining refractories, is easier to handle, and is a more efficient sulphur remover. However, refinements in methods of addition so that close contact between carbide and metal are maintained probably will offset the high cost factor.

In a second paper Michael Tenenbaum, co-author with T. L. Joseph, University of Minnesota, Minneapolis, stated that experimental data indicated that pure carbon monoxide reduced iron oxide about one-fourth as rapidly as pure hydrogen, but doubling the pressure increased rate of reduction about 23 per cent. Dilution of carbon monoxide with nitrogen, and with carbon dioxide decreased the reduction rate, but doubling the pressure did not increase the rate sufficiently to overcome that reduction.

Cupola Cast Iron

Final paper of the session by W. L. Meinhart, co-author with N. A. Ziegler and A. J. Deacon, Crane Co., Chicago, pertained to graphitization of cementite in cupola cast iron. The investigation was carried out by use of a dilatometer to determine growth of specimens under controlled conditions, and by microscopic examination. Data obtained from dilatometer measurements were plotted in graphical form which indicated that graphitization is a diffusion phenomenon similar to austempering and age hardening.

More than 200 members and guests attended the annual autumn dinner of the American Institute of Mining and Metallurgical Engineers which was held at 8 p.m. at the Blackstone hotel. J. Hunter Nead, Inland Steel Co., Chicago, and chairman of the Iron and Steel division acted as toastmaster. Wilfred Sykes, assistant to the president, Inland Steel Co., and a national director of the A.I.M.E. gave the address of welcome, and the response was made by R. H. Leach, Handy & Harman Co., New York, and chairman of the Institute of Metals division. C. M. White, vice president in charge of operations, Republic Steel Corp., Cleveland, was the principal speaker of the evening, and his subject was "Citizenship."

American Society of Metals Technical Session

(Continued from Page 55)

used in the investigations. Results were shown in a number of curves relating the annealing variables, amount of prior cold reduction and type of steel, to hardness and in some cases to degree of recrystalization and grain size.

E. C. Bast, University of Illinois, presented a paper prepared by himself and R. E. Kramer also of the university engineering school, on the prevention of flakes by holding railroad rails at various constant temperatures. Importance was stressed of preventing flakes in steel and it was suggested some rolled or forged products still contain flakes. The authors reported the results of experiments to determine the length of time necessary to hold specimens of 131-pound rails at temperatures of 1100, 900, 700, and 500 degrees fahrenheit to prevent the formation of flakes in rails rolled from hydrogen-treated ingots. It was concluded that, with the rails used, formation of flakes was prevented by holding the specimens 3 hours at 1100 degrees fahrenheit, 4 hours at 900 and 700 degrees, and 5 hours at 500 degrees.

Third paper of the session was on selection of steel and heat treatment for spur gears, presented by H. B. Knowlton and E. H. Snyder, International Harvester Co., Chicago. An unusual situation developed here. Because of conflicting schedules a great number of those who came to hear the paper, arrived too late. When there was standing room only, Mr. Knowlton, when called on by the chairman, consented to discuss again the highlights of the paper.

Spur Gears

The selection of the steel and the type of heat-treatment for case-hardened spur gears was discussed on the basis of results or service experienced and certain laboratory tests. Different types of gear failures were described. It was shown that for certain types of gears which must stand heavy loads for many cycles of stress, type of failures to be overcome is pitting or spalling of gear tooth surfaces. Quenching directly from carburizing was reported superior to double quenching as far as resistance to pitting was concerned. This was said to be true of a number of different steels. Some information on different methods of testing gears was given, and a special gear-testing dynamometer used in the experiments was described by the authors. A new type rolling fatigue machine for determination of resistance to pitting also was described and results discussed.

V. Brown, metallurgist, Republic Steel Corp., Chicago, favors the use of a proper time quench of steel where an oil quench would be inadequate and where critical design is a handicap for a conventional full-water quench, because of the danger of quench cracking.

The speaker explained a simple time quench as one where the part is quenched in water for a given length of time, then removed and allowed to finish its cooling in air. The interrupted quench, he stated, is one where the part is quenched for a given length of time in water, removed and exposed to the influence of air for a definite time, then returned to the water to finish the quench.

Although time quenching should not be considered a panacea for problems of low hardenability oil quenching steel, or for parts showing a tendency to crack in water, its use can be widened by an understanding of the effect of the stepped cooling rate which results in the time quench.

Rating Quenching Baths

Rating quenching baths by a temperature at which soft spots first arise has been found highly satisfactory, based upon the findings of F. W. Trembour, research engineer, Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. The larger the piece, the more the temperature of the adjacent zone of quenching liquid is raised. The medium providing freedom from soft spots at the highest bath temperature is the best for shop use so far as obtaining uniformity of hardness is concerned.

A factor which influences the proportion of soft spots formed is the position in which the test pieces are plunged into the quenching bath. The authors found that quenching the steel cylinder of the standard size adopted in a vertical position will tend to give a greater percentage of soft area, but also a greater variability in results than will quenching with the longitudinal axis of the cylinder in the horizontal position. They prefer the latter method.

The authors found after considerable research that moderate additions of common salt to water reduce materially the incidence of soft spots and reduce slightly the penetration

of hardening. Caustic soda acts in the same manner except that the optimum concentration is 3 per cent or less by weight and concentration less critical. The work of the authors shows that the contents of sodium chloride and hydroxide near saturation are decidedly harmful as is 4 per cent of borax or sodium fluoride.

G. T. Williams, metallurgist, Deere & Co., Moline, Ill., finds that the end-quenched hardenability test developed by Jominy and Boegehold is not critical with respect to length or diameter of specimen, nor as to quenching water temperature, and gives excellent reproducibility of results.

The speaker mentioned that the differences in hardenability among steels of the same type may be greater than those from type to type after ordinary heating times. He suggested that homogeneous austenite before quenching is required for maximum hardenability, and that degree of banding is a possible indication of the ease or difficulty with which this will be attained.

(To be concluded next week)

Spray-Booth Compound Reduces Fire Hazard

■ A new spray-booth compound to facilitate cleaning of spray booths and reduce fire hazard and marring of finished work by dirt spots has been developed by Maas & Waldstein Co., 438 Riverside avenue, Newark, N. J.

The compound, a nonhardening, non-oily paste is brushed on all exposed surfaces of the booth. The residues from the sprayed lacquer, paint or enamel hence deposit on the compound. When it is desired to clean the booth, the compound and the residues are easily and completely removed with a putty knife, without using a flammable solvent.

Synthetic Tank Lining

■ A new tank lining, "Koroseal", for handling nitric, chromic, mixed nitric and hydrofluoric and similar solutions has been developed by B. F. Goodrich Co., Akron, O. An inert elastic synthetic, the new lining contains no rubber and is claimed to resist effectively the few acids not successfully handled by rubber.

With lining unprotected, temperatures may be as high as 130 degrees Fahr. For linings subject to physical damage or higher temperatures brick sheathing is used.

Gun on Extension Handle Aids Welding

■ Combining a light-weight hydraulic spot welding gun and an aluminum current-carrying extension arm, a welder built by Progressive Welder Co., 737 Piquette avenue, Detroit, has simplified the problem of spot welding in relatively inaccessible locations such as on the four long inside seams of the circulator heater cabinet pictured here. As shown, the entire length of each seam can be welded in one continuous operation.

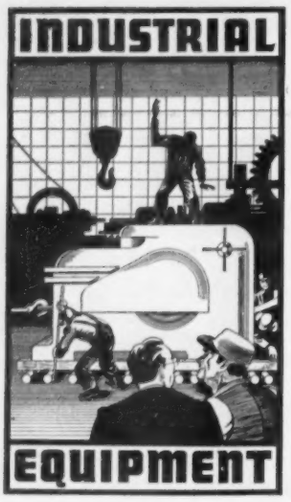
In addition to carrying the welding current, extension handle is hollow to permit supply and return of water for cooling gun and welding points. Hydraulic pressure supply to the pressure cylinder on the gun is carried in a flexible hose along the top of the handle. Pushbutton control at the operator's end of the unit is in the form of a handle for easy manipulation.

Jig Positions For Welding

In production, the heater cabinet shown is stamped and formed in vertical sections. The sections then are placed in a jig and operator places welding points of gun in position and begins making the welds on 1½-inch centers, sliding the gun down the entire length of the seam in one continuous operation. To permit close control of spot locations and to provide easier operation of the unit for the section of the seam beyond the middle, a wheel mounted on the under side of the extension handle provides the necessary support.

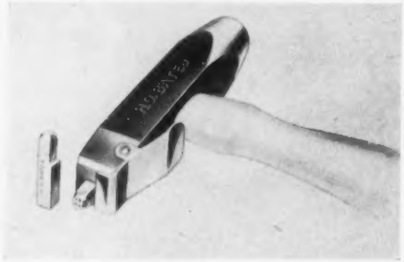
Included in the equipment is the t'ming control and a transformer on which is mounted the hydraulic booster supplying the pressure cylinder on the gun. Timing is ent'rely automatic. Production speed using this equipment is about 40 cabinets per hour.

Welding gun mounted on current-carrying extension handle (upper) is placed in welding position for continuous spot welding of inside seam of circulating heater cabinet. Trolley wheel riding on edge of seam (lower) facilitates control and locating of welding gun when making spots near the end of the seam



Inspector's Hammer

■ H. O. Bates, Elizabeth, N. J., has placed on the market Hercules inspectors' hammer using an improved shoulder style of interchangeable type. Hammer is constructed of a shock-resisting alloy steel and spring clip holding the type in posi-



tion is of spring steel. A holder at each end of the hammer and larger hammer stamps to take more than one piece of type are available.

Low-Power Gearmotor

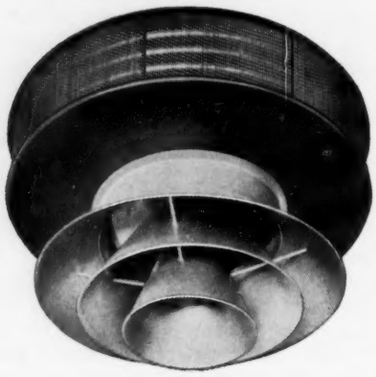
■ Dumore Co., Racine, Wis., offers type KD heavy-duty, double-reduction gearmotor, which has a winding of lower power than the other motors in this series. The output at the armature shaft is 1/10-horsepower at 7000 revolutions per minute. Housing is cast iron, finished in black crinkle enamel. Composition bronze bearings are used throughout. Motor is mounted by means of machined face, a pilot boss and four tapped holes around the output shaft.

The output shaft may be brought

out horizontally to the left or parallel to the armature shaft if desired. Gearing is of the worm type, and has hardened steel worms functioning with a bakelite gear in the first stage and a hardened steel gear in the second.

Heater with Anemostat

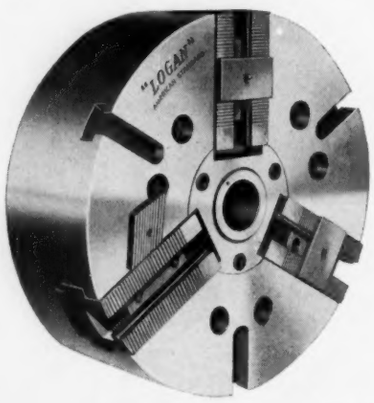
■ Trane Co., La Crosse, Wis., announces its projection unit heater is now available with an anemostat to provide low-velocity absolutely



dustless air currents. The vertical air stream is distributed without drafts or blasts. People may sit directly under the unit in perfect comfort even on low ceiling installations.

Power Chucks

■ New "Logan" power chucks are announced by Logansport Machine Inc., Logansport, Ind. Bodies of these chucks are accurately machined one-piece electric steel castings. Jaw levers are chrome nickel



steel, drop forged and heat treated for maximum strength. All lever pins are nickel steel alloy, hardened and ground. Jaw lever blocks and center draw sleeve are hardened and ground steel.

Industrial Truck

■ The new series F Hy-Lift trucks of Baker-Raulang Co., 2168 West Twenty-fifth street, Cleveland, are built in capacities of 1½ and 2 tons.

The 1½-ton truck has a single trailing axle and the 2-ton truck a fully compensating, tandem trailing axle. Standard platforms are from 18 to 36 inches wide, 48 to 72 inches long and 7 inches high in the lowered position.

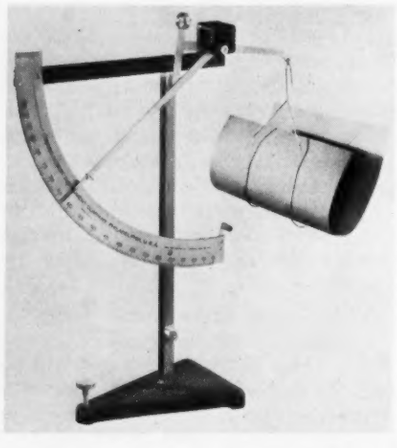
In the tiering models, nontelescoping lifts are available up to 10 feet and a telescoping feature may be had for extreme lifts with a low overall height. A low-lift model has the platform 9 inches high in the lowered position with larger tires on the trailing axle.

Overall width is 32½ inches and, with a platform 48 inches long and driver's step folded, overall length is 93⅜ inches. With standard 18 x 48-inch lift platform, the trucks will operate in intersecting aisles 56 inches wide. Travel speeds are up to 6 miles per hour and lifting speeds up to 20 feet a minute. Ample battery compartment space is provided.

Basis-Weight Scale

■ Thwing-Albert Instrument Co., 3339 Lancaster avenue, Philadelphia, announces a desk-type basis-weight scale operating on ball bearings to reduce friction to a minimum and increase sensitivity. Scale dial is 17½ inches long and scale is 20 inches high.

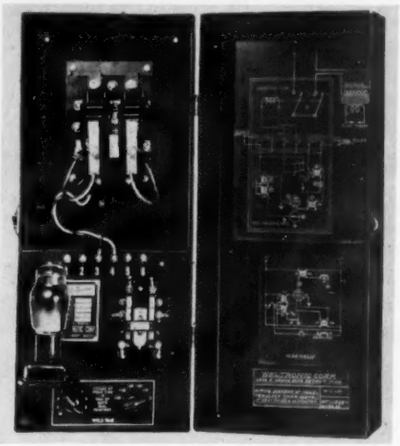
Scales are finely finished. Base and frame have black crystalline finish and other parts are satin-finish polished brass. Scale is made in



ranges of 0 to 50, 100 and 125 pounds and for 480 and 500 sheets count. Special ranges are available.

Weld Timer, Contactor

■ A new low-cost combination weld timer and contactor to provide positive weld timing control for virtually any manually operated 1 to 15-kilovolt-ampere spot welder and capable of such accuracy as to permit the welding of even stainless



steel, aluminum or brass is announced by Weltronic Corp., 2832 East Grand boulevard, Detroit.

Available for either 110, 220 or 440 line voltages and 25, 50 or 60-cycle frequencies, the new timer-contactor, known as model 90-53, is adjustable in one cycle steps over the standard 1 to 60-cycle timing range.

The device consists of a single electronic tube, a relay and a contactor together with time selector switch mounted in a compact, spring-hinged cover case.

Electric Arc Welder Has One Control

■ A single operator motor-generator arc welder, requiring only one control device for operation is announced by Wilson Welder and Metals Co. Inc., 60 East Forty-second street, New York. Known as the Wilson "Hornet," this welding machine employs for its control a single, simple handwheel located on top of the unit. Adjustment of this handwheel permits the operator to obtain an infinite number of current settings. Dial markings are so accurately calibrated that meters are not required.

Single-pole control design assures a current output that will not vary, resulting in a constant, uniform arc at all times. Accidental reversal of polarity is impossible because a small snap switch must be flicked by the operator to change the polarity.

The welder is a two-bearing unit, with motor rotor and generator armature mounted on a common shaft. Adequate ventilation is furnished by propeller blades attached to the revolving shaft and although shielded arc electrodes are recommended, the welder will operate with equal efficiency with bare electrodes.

The welder is supplied in three sizes rated 200, 300 and 400 amperes.

Facepiece For Gas Mask

■ Mine Safety Appliances Co., 230 North Braddock avenue, Pittsburgh, announces a light-weight facepiece for gas masks which has maximum lens area with less dead-air space and lens less likely to fog.

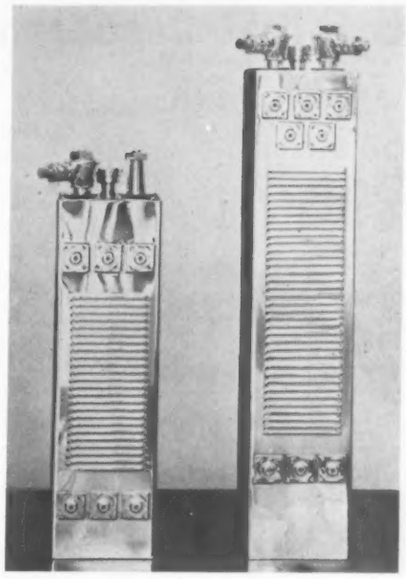
Incoming air stream is directed over entire area of lens by a new type deflector built integral with

facepiece to prevent fogging. "Pressure points" causing headaches and fatigue are eliminated by making facepiece of molded soft rubber that will follow the contour of the face.

Storage Battery Cell Has Increased Output

■ Storage Battery division of Thomas A. Edison, Inc., West Orange, N. J., announces a new "D-type" steel-alkaline storage battery cell which is claimed to provide 33 1/3 per cent more electrical energy without any increase in floor space.

Batteries made up of the new "D-type" cell are especially useful for installation where floor space must



be conserved, such as on small and heavy-duty industrial trucks operating 24 hours a day with only one battery change and on trucks operating through narrow clearances.

Portable Fountain

■ Dobbins Mfg. Co., North St. Paul, Minn., is marketing a portable drinking fountain to supply cool water to transient crews of workmen. Water placed in this unit at 50 degrees Fahr. is claimed to rise less than 10 degrees in 10 hours even if subjected to a constant outside temperature of 90 degrees. Inside of container is made of heavy-gage Enduro stainless steel. Between this and outside jacket of galvanized steel are several layers of corrugated air cell insulating material. A 5½-inch filler opening permits use of ice if desired. Flow is supplied through tilting-type bubbler operated by thumb pressure. Enduro stainless steel guard around bubbler affords sanitary protection for user. Built-in valve keeps water flow constant at all times. Four gallons is standard capacity. This size weighs 22 pounds, is 8⅜ inches in diameter and has an overall height of 27 inches.

Original Researches Presented by Wire Association Speakers

■ HARD DRAWN wire was recommended for the manufacture of high-grade welding rods by J. C. Joublanc, technical director, electrode division, Harnischfeger Corp., Milwaukee, at the opening session of the Wire Association, Congress hotel, Chicago, Oct. 23. Two-pass wire affords arcability and cutting without a burr and is highly desirable, he stated. Swedish iron gives a stable bare wire.

The flare from the arc can be dammed up by the use of a high-melting refractory material in the coating though it introduces other undesirable characteristics, he asserted. If the sulphur content of the rod is high the melting point of the sulphur inclusions are low. Sulphur liberated is responsible for the burst which occasionally occurs in the arc.

Discussion brought out the fact that the quality of weld metal is just as good with 1-pass wire as with 4-pass stock.

Wire Pickling

W. G. See, sales and service manager, Submerged Combustion Co. Co. of America, Hammond, Ind., cited pickling of wire or rods in coil form as one of the most practical applications for submerged combustion. By the use of a submerged unit, the speaker stated that the average pickling time on various grades of steel will run from 30 to 60 per cent of former practice if the operating temperature is held the same as it was with steam. One of the advantages afforded by this type equipment is the constant temperature. He mentioned that in one plant rejections of wire rod coils were reduced from about four to six loads per day to about one load every two weeks on account of constant temperature and extreme agitation of the submerged heating unit. It is possible to pickle 1 ton of steel rods at a fuel cost of 5 cents per ton using 1000 B.t.u. gas at 50 cents per 1000 cubic feet, he mentioned in conclusion.

Moving pictures of Boulder dam and the 287,000-volt transmission lines to take the bulk of the power to Los Angeles, Calif., were presented by Dr. D. M. Simmons, chief engineer, General Cable Co., New York.

Production performance of a strand unit is calculated from three factors, wire size, speed of wire through the unit and the number of strands run, according to R. R. Tatnall, metallurgical engineer, Wickwire Spencer Steel Co., Worcester, Mass. Of the three factors used in production calculations, wire size enters only through a physical relation to weight which is entirely independent of equipment, he stated. Wire speeds and number of strands have definite relations to other characteristics of the equipment and are effected by various elements of design.

A sound film depicting the manufacture of Swedish steel wire was presented by the Uddeholm Co. of America, New York.

J. S. Little, manufacturing engineer, Western Electric Co., Kearny, N. J. announced that a method has been developed for economically manufacturing insulated wire for telephone exchange area cable by making the paper on the wire. This method, he explained, has made it possible to increase the number of wires in a full size cable by 250 per cent over the number in use in 1914.

The performance of the brazing operations in a reducing atmosphere may seriously embrittle any oxygen bearing copper being brazed and consequently result in weakness in or adjacent to the joint, in the opinion of L. L. Wyman, research engineer, General Electric Co., Schenectady, N. Y. In brazing copper, he stated, clearances should be kept small in the interests of high strength and the loading of the outside of the joint with excess solder is but a waste of expensive metal. He recommended clearances maintained at 0.002-inch between parts being joined as good practice.

Lap Joints

Recommended practice dictates that for the design of lap joints which are subject to shear, the lap should be so made that the shear area is fully three times that of the sections being joined. From both the physical and electrical standpoints, the lap joint is preferable to most other types of joints, he asserted, and should be used whenever possible in making assemblies.

Tuesday afternoon members and guests of the Wire association visited the Hawthorne works of the Western Electric Co.

S. P. Watkins, manager, sales development, Rustless Iron & Steel Corp., Baltimore, and recipient of the Wire Association annual medal award for the most meritorious paper on wire manufacture or fabrication for 1939 pointed out that stainless steels have solved many of industries' toughest corrosion problems and although not a panacea for all such evils, they are the lowest cost materials available having a wide range of resistance to industrial conditions.

He directed attention to the fact that stainless steel embraces a present group of over 60 different analyses, each with its own specific characteristics. Out of many possible elements which might be alloyed with iron and steel, the speaker asserted, chromium is the only one yet found that has the unique property of conferring upon them, at a reasonable cost, remarkable resistance to corrosion and oxidation.

Other elements are added to impart special characteristics. Molybdenum increases corrosion resistance and silicon protects against scaling and oxidation at high temperatures. Sulphur and selenium above 0.15 per cent impart free-cutting and nonseizing characteristics, he explained. Tungsten additions increase strength at high temperatures and titanium and columbium are helpful in preventing carbide precipitation in the 18-8 alloys.

Use of Stainless Steel

Since 1929 the output of stainless steel ingots as cited by the speaker, has increased from 55,000 tons to over 156,000 tons in 1937, the year of greatest production. Last year the ingot production dropped to about 95,000 tons and cut of this was produced over 56,000 tons of finished product. At present wire comprises a small proportion of stainless steel production, amounting to only 3518 tons in 1938, or 6.2 per cent of the total rolled tonnage.

Over 60 grades of stainless steel are commercially available according to Mr. Watkins, but most of the wire made is in two grades; 18 per cent chromium and 18 per cent chromium and 8 per cent nickel.

Although the 18-8 of regular analysis cold heads satisfactorily, some advantage is gained by raising the nickel content from 8 to above 10 per cent, the speaker contended. The higher nickel serves to reduce work hardening which is conducive to better die performance. In addition, he stated, this type material is more suitable for making cap screws which have trimmed heads.

Dr. C. L. Mantell, plant engineer, W. B. Driver Co., Harrison, N. J., in discussing electric resistance wires mentioned that the production of wire with satisfactory life performance at high temperatures depends upon clean, sound, gas-free, workable ingots of controlled grain size. Additions of minute amounts of grain refiners or protective elements, he cautioned, must be care-

fully controlled, otherwise cleanliness and workability are affected.

Conversion of accelerated life test values into service life indicates that quality wires used in electrical appliances such as toasters used 30 minutes a day and being turned on and off four times during that period, would last more than 50 years, or about 100,000 cycles of heating and cooling at the operating temperature.

Electrical resistance wire, he explained, is precision material manufactured under the watchful combination of the chemist, the metallurgist, the physicist, the electrical and the mechanical engineers and whose quality is being augmented by co-ordinated research.

Consumers of solder in wire form have become conscious of the necessity of securing the exact wire size for each operation, according to R. A. Gardiner, president, Gardiner Metal Co., Chicago. The finer the wire the less solder consumed per joint and the less heat is required to melt it, thus faster and more accurate production. In conclusion he stated that wire solder has been made for centuries but not until recent years has it played such an important part in all fields of industry.

Dr. S. A. Braley, chief metallurgical field engineer, Pittsburgh Steel Co., Pittsburgh, in presenting the Mordica memorial lecture, pointed out that only within the past 15 years has there been any progress made in the production of wire materials for fabricated products. In the early days, he said, small quantities of wire were drawn by hand or forged; dies were crude, and no lubrication was available. Today the trend of the wire industry is to produce material of uniform quality.

He warned that new variables are being introduced into the manufacture of wire by way copper in the scrap employed. The trend is toward copper-bearing steels ranging from 0.20 to 0.30 per cent copper. The same thing is true of nickel and chromium.

♦

Steel's Technology Brings Low Prices, High Wages

■ Drastic reductions in prices of iron and steel products during the past century were made possible by improvements in the steel industry's production methods, it is disclosed in a study by American Iron and Steel institute.

Technological progress enabled the industry to reduce prices 50 to 75 per cent during this period, while at the same time increasing average hourly wages from 13 cents to more than 83 cents.

Most substantial price decline is noted in steel rails. In 1868 steel rails sold for up to $174 per ton; today's consumer pays $40 per ton, 77 per cent less, for vastly superior rails. While cut nails brought $6.12 per 100-pound keg in 1839, subsequent development of the wire nail and advances in manufacturing technique now permit a $2.40 price for nails. In 1873 galvanized sheet iron commanded a price as high as 13 cents a pound; today a far better galvanized sheet steel product sells at 3.5 cents per pound.

Pig iron sold for as much as $34 per ton in 1839, or 40 per cent more than the current rate for No. 2 foundry iron at principal northern furnaces.

Fears Flight of Industry Under Arms Embargo

■ If United States refuses to sell manufactured goods to nations anxious and able to buy, American capital will build plants in countries free of such restrictions, it was asserted last week by W. A. Morton, president, Amsler-Morton Co., Pittsburgh. Recently returned from a 16-month business tour of Europe and Asia, Mr. Morton called the arms embargo illusory, urged its repeal.

"From the economic standpoint," he said, "we have not learned our lesson from the last war if we are again, though in different manner, to be a loser. Refusal to follow through in our natural role as an industrial and exporting nation will permanently divert much of the important European market for American goods. Let us make certain the overwhelming desire for peace does not cloud our judgment.

"I can see no moral justification for the embargo. It is like stopping a poker game when one player has the largest stack of chips. Moreover, any attempt to distinguish between offensive and defensive war weapons is a delusion. Every material used in daily existence is a weapon of war in this world of force."

Texas Antimony Smelter Bars War Use of Metal

■ Texas Mining & Smelting Co., Laredo, Tex., manufacturer of metallic antimony and oxide, smelted from Mexican ore, is including in its contracts a stipulation that none of the metal shall be used for war or speculative purposes.

Founded in 1930, the company started production in 1931. Through the lean years that followed the company concentrated effort on producing high quality metal and when shipments from China were curtailed by war was in a position to supply much of the domestic demand.

Antimony is used in automotive bearings, batteries, electrical equipment and paint and as an alloy in numerous metals.

V. G. Kegler is president, W. J. Graveling vice president, F. G. Trobridge secretary-treasury. These officers, with Nat B. King, form the board of directors.

Skip-Handling Crane Mounted on Truck

■ **This full-powered skip-handling crane can swing a 3000-pound load at a 12-foot radius from truck platform to ground. Each function is independently controlled by a lever operating a clutch. The crane can swing through 180 degrees and functions safely on grades up to 8 per cent in any direction. An automatic safety brake holds the load at any height. Photo courtesy Gar Wood Industries Inc., Winch division, 7924 Riopelle street, Detroit**

New Car Dumper

(*Concluded from Page 46*)

by equipment for spotting cars on the dumper. Cradle operating speeds permit hoisting, dumping and lowering cars within the allotted time, with automatic control regulating the speed at critical points in the cycle.

Railroad officials point out the new apparatus slides rather than actually dumps the coal. Retarders permit continuous loading of vessels below and insure against damage to prepared coals. The sprinkler system is controllable for different grades of coal. Pan carries 125 tons of coal, with sloping sides at a steep angle to assure free run. Discharge opening from pan to telescoping chute is unusually large, being 20 square feet in area.

Completely electrical, the plant is supplied with 3-phase 60-cycle current at 23,000 volts, reduced by substation on the premises to 2300 volts. Ward-Leonard control is used on mule and cradle drives. Direct-current rheostat control is used on auxiliary drives, including pan hoist, girder screw and chute motors. Utility hoist is located on top of dumper and driven by alternating-current motors and control. Equipment permits cleaning or repairs when the main plant is not in operation.

Main-drive power is supplied by two 4-unit 5-bearing synchronous motor-generators and one 375-kilowatt constant-voltage generator driven by a 2300-volt synchronous motor. Mule and cradle each are driven by 500-horsepower direct-current motors with armatures same as those on the 450-kilowatt generators, which makes it necessary to carry only one spare armature for the four generators and four motors used for main drives for the dumper.

Electrical Loading Diversified

Feature of the electrical equipment is that one generator on each of the main sets is connected to the mule and the same hook-up used on the cradle, which is counterweighted to reduce power demands. This permits a diversity of loading on the motor-generator sets.

When mule is handling a loaded car, the cradle is coming down light. When load on the mule is light, cradle is being hoisted under load. This system helps the dumper to operate even though a major piece of apparatus should fail.

Other features include an engine room ventilated by a blower and filter arrangement furnishing fresh clean air at all time. Dumper is equipped with numerous floodlights for night operation.

Loaded car yard capacity is 350, with space for 200 empties. Different tracks are allotted to different grades of coal, contributing to smooth running operations when dumping.

Dredging work and dock and pier construction for this dumper were begun in November, 1937, with the dumper itself being completed and put into operation only recently. With capacity for continuous car-a-minute dumping, the new equipment betters former record of 58 cars an hour once attained by another dumper.

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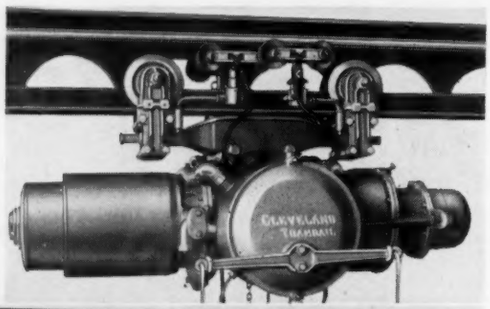
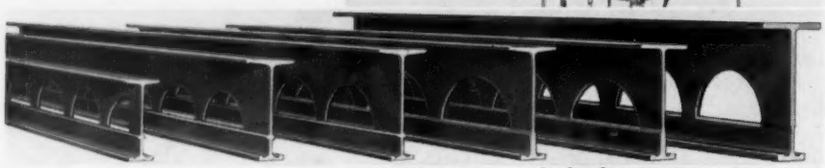
Primer Inhibits Dust

■ A zinc chromate primer announced by Egyptian Lacquer Mfg. Co., 1270 Sixth avenue, New York, may be applied by spraying or dipping and can be air-dried or baked. It is claimed to be exceptionally rust-inhibiting, to fill bridges or minor imperfections in metal and to have excellent spreading capacity. Primer may be used in a multicoat, single bake system and is good for exterior or interior use.

CLEVELAND TRAMRAIL
ARCH BEAMS





RIGHT: One ton Cleveland Tramrail electric hoist with hand-propelled carrier operating on Cleveland Tramrail arch beams.

A SIZE FOR EVERY PURPOSE
—for loads up to 5 tons

Arch beams are used for applications where regular Cleveland Tramrail rail does not lend itself to long spans or where satisfactory superstructure cannot be provided.

They consist of a wide flanged "T" member to which is welded a high-carbon long-wearing Tramrail rail with flat raised treads. The treads are hard and smooth. They eliminate troublesome peining which is common with systems subjected to severe service and continued rolling action of carriers.

Tramrail arch beams are an exclusive Cleveland Tramrail development and are available in six different depths to suit varying span conditions. They represent one of the many reasons why Cleveland Tramrail can serve you better.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 Depot Street • Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

Buying Moderates; Mills Push Output

Heavier Orders Booked For First Quarter; Prices Awaited

MARKET IN TABLOID ★

Demand
Strong; buyers seeking early shipments.

Prices
Firm, with some premiums offered; scrap steadier.

Production
Up 1 point to 92 per cent, ten-year peak.

■ STEEL markets are more orderly. Insistence of buyers for shipments continues, but heavier deliveries are commencing to satisfy more urgent needs and new orders are largely for next quarter delivery.

Little additional business is being accepted for shipment by Dec. 31 in bars, plates, wire and flat-rolled steel. While capacity in these products is almost completely filled for remainder of the year, some producers still able to offer tonnage in sheets and plates are obtaining premiums of $5 a ton for early delivery.

First quarter bookings continue to increase despite absence of definite prices. Buyers are more confident they will escape large price advances but are anxious to be assured of deliveries.

Ingot production is tending to level off as additional plants reach capacity and as forced shutdowns for repairs frequently find no idle furnaces available for substitution. Steelmaking last week rose 1 point to 92 per cent, highest capacity engagement since August, 1929, and largest weekly tonnage in history. A year ago the rate was 54½. Another blast furnace has been blown in at Pittsburgh, giving the district 41 active stacks out of 50.

Requests of steel buyers for quickened deliveries and orders to warehouses for tonnages which normally are placed with mills attest to the current and prospective increase in consumption.

Railroads continue a high-light of steel demand, eclipsing the automotive industry, at least temporarily, in view of strike-hampered operations of the latter. Headed by 69,700 tons for the Santa Fe railroad, last week's rail orders exceeded 160,000 tons, in addition to a large tonnage of accessories.

Rail buying is far ahead of volume a year ago, most of the gain resulting from the fact the carriers did not start to enter the market for 1939 needs until November. Bulk of the tonnage was booked the first quarter this year. Fear of delays in shipments has prompted the roads to contract for 1940 rails sooner than usual and also has been a factor in stimulating freight car buying. Last week's car awards totaled 3200, including 1500 for the Baltimore & Ohio and 1400 for the Northern Pacific.

Some automotive parts interests have curtailed output either because of closures by strikes or because of the Chrysler shutdowns. This has lifted some of the pressure for steel shipments, but active demand in other directions has prevented any letdown in deliveries. Automobile assemblies last week totaled 78,105 units, a gain of 8000 over the previous week's revised figure, and comparing with 73,335 a year ago. Brisk retail demand would push output well over 100,000 units were it not for labor troubles. First sizable foreign business in military equipment has appeared in the form of several thousand trucks placed by France.

Bookings of export steel continue restricted by the crowded condition of mill schedules the next 60 days. Foreign tonnage is expected to occupy a more prominent position on order books next quarter, in view of availability of such business at fairly attractive prices.

Inquiries from domestic buyers regarding first quarter quotations continue numerous, but opening of books is deferred. Meanwhile, softening of the scrap market has halted for the time being the threat of additional cost increments from that direction, although the higher prices paid for old material in recent weeks will become increasingly prominent in cost figures as this tonnage is consumed. STEEL'S scrap composite dipped 17 cents last week to $20.83, but prices are resisting a further decline in a number of districts.

Tin plate output is holding at 95 per cent and apparently has reached a peak, since additional capacity is not available for use immediately. Little business has been taken for first quarter delivery.

Pig iron shipments are sustained at the year's best rate, influenced by increased consumption and inventory additions. Talk is heard in some districts of possibly another price increase, but such action may be regulated by what revisions are made in steel quotations.

Most changes in district steelmaking last week were small. Pittsburgh was up 2 points to 91 per cent; Chicago rose 1 point to 90; Youngstown declined 2 points to 92. Other increases included 7 points to 93 at Buffalo; 4 points to 94 at Birmingham; 6 points to 78 per cent in eastern Pennsylvania; and 3 points to 80 at St. Louis. New England was off 10 points to 90 and Detroit dropped 1 point to 95. Unchanged areas were Wheeling at 93, Cleveland at 90, and Cincinnati at 88.

COMPOSITE MARKET AVERAGES

	Oct. 28	Oct. 21	Oct. 14	One Month Ago Sept., 1939	Three Months Ago July, 1939	One Year Ago Oct., 1938	Five Years Ago Oct., 1934
Iron and Steel	$37.56	$37.56	$37.62	$36.67	$35.82	$36.48	$32.10
Finished Steel	55.90	55.90	55.90	55.60	55.62	57.04	54.00
Steelworks Scrap..	20.83	21.00	21.83	17.97	14.72	14.00	9.40

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Oct. 28, 1939	Sept. 1939	July 1939	Oct. 1938
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.25c
Steel bars, Chicago	2.15	2.15	2.15	2.25
Steel bars, Philadelphia	2.47	2.47	2.47	2.57
Iron bars, Terre Haute, Ind.	2.15	2.05	2.05	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.00	2.00	2.00	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.15
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.00	2.00	2.00	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.15
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.35
Wire nails, Pittsburgh	2.55	2.40	2.40	2.45

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to 5/16-inch, Pitts.	43.00	43.00	43.00	43.00

Pig Iron

	Oct. 28, 1939	Sept. 1939	July 1939	Oct. 1938
Bessemer, del. Pittsburgh	$24.34	$23.35	$22.34	$22.34
Basic, Valley	22.50	21.50	20.50	20.50
Basic, eastern, del. Philadelphia	24.34	23.54	22.34	22.34
No. 2 foundry, Pittsburgh	24.21	23.20	22.21	22.21
No. 2 foundry, Chicago	23.00	22.20	21.00	21.00
Southern No. 2, Birmingham	19.38	18.58	17.38	17.38
Southern No. 2 del. Cincinnati	22.89	22.09	20.89	20.89
No. 2X, del. Phila. (differ. av.)	25.215	24.415	23.215	23.215
Malleable, Valley	23.00	22.00	21.00	21.00
Malleable, Chicago	23.00	22.20	21.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	29.54	28.34	28.34
Gray forge, del. Pittsburgh	23.17	22.15	21.17	21.17
Ferromanganese, del. Pittsburgh	105.33	95.35	85.33	97.77

Scrap

Heavy melting steel, Pittsburgh	$22.75	$18.75	$15.55	$14.95
Heavy melt. steel, No. 2, E. Pa.	19.75	17.10	13.55	12.95
Heavy melting steel, Chicago	18.75	16.25	13.55	13.05
Rails for rolling, Chicago	21.75	19.65	17.75	16.25
Railroad steel specialties, Chicago	21.75	18.00	15.50	15.55

Coke

Connellsville, furnace, ovens	$5.00	$3.75	$3.75	$3.75
Connellsville, foundry, ovens	6.00	5.00	5.00	5.00
Chicago, by-product fdry., del.	10.50	10.50	10.50	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.00c
Chicago, Gary	2.00c
Cleveland	2.00c
Detroit, del.	2.10c
Buffalo	2.00c
Sparrows Point, Md.	2.00c
New York, del.	2.24c
Philadelphia, del.	2.17c
Granite City, Ill.	2.10c
Middletown, O.	2.00c
Youngstown, O.	2.00c
Birmingham	2.00c
Pacific Coast points	2.50c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast points	3.65c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast points	4.00c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.50c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.35c	3.95c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold stp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c-2.54c
Philadelphia, del.	2.15c-2.40c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.35c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c-2.35c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast points	2.60c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	3.95c

Standard Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast points	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast points	2.75c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Detroit, delivered	2.25c
Cleveland	2.15c

Buffalo	2.15c
Birmingham	2.15c
Gulf ports	2.50c
Pacific Coast points	2.75c

Iron

Chicago, Terre Haute	2.15c
Philadelphia	2.37c
Pittsburgh, refined	3.50-8.00c

Reinforcing

*New Billet Bars, Base**

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

*Rail Steel Bars, Base**

Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

**Base prices 20 cents less per 100 lbs. in lots of 20 tons or over of one size, in lengths of 30 feet or over, for shipment at one time to one destination.*

Wire Products

Pitts-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per pound)	
Polished fence staples	2.55c
Galv. barbed wire, standard 12½ gage two-point hog, 80-rod spool $2.88; two-point cattle, 80-rod spool	$2.70
Annealed fence wire	2.90c
Galv. fence wire	3.30c
Woven wire fencing (base C. L. column)	67.00
Single loop bale ties (base C. L. column)	56.00

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.65c
Spring wire	3.20c

Worcester, Mass. $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh $3.70

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

* Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.00c
Detroit, del.	2.10c
Philadelphia, del.	2.32c
New York, del.	2.36c
Pacific Coast points	2.60c
Cooperage hoop, Youngs., Pitts.; Chicago, Birm.	2.10c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c
Carbon Cleve., Pitts.	
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, for full containers additional 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
6-inch and less	67	70
⅞-1-inch	64	65
1⅛ and larger	62	62

Hexagon Cap Screws

Upset, 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific coast ports	2.90c

Rivets, Washers

Structural, Pittsburgh, Cleveland, Chicago	3.40c
½-inch and smaller, Pitts., Chi., Cleve.	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers	
and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75	off

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	.....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼ "O.D.	13	9.26	10.67
1½ "O.D.	13	10.23	11.79
1¾ "O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼ "O.D.	13	14.54	16.76
2¼ "O.D.	12	16.01	18.45
2½ "O.D.	12	17.54	20.21
2¾ "O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½ "O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½ "O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl.	43.00
Do., over ⅜ to 41/64-in.incl.	48.00

Worcester up $2; Galveston up $6; Pacific Coast up $9.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$5.00- 5.50
Connellsville, fdry.	5.75 -6.25
Connell. prem. fdry.	6.00- 6.50
New River fdry.	6.50- 6.75
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.00
Milwaukee, ovens	10.50
New England, del.	12.50
St. Louis, del.	11.00-11.50
Birmingham, ovens	7.00
Indianapolis, del.	10.00
Cincinnati, del.	9.75
Cleveland, del.	10.30
Buffalo, del.	10.50
Detroit, del.	10.25
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	22.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (200 lb. drums)	16.25c
Do. (450 lbs)	15.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	6.75c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.§	19.38	.....	18.38	24.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	21.00	.....	.....	.....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:

Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.45	25.45	24.95	24.95

	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis, northern	23.50	23.50	23.00	....
St. Louis from Birmingham	†23.12	....	22.62	....
St. Paul from Duluth	25.63	25.63	....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $27.50; 6.51-7—$28.00; 7-7.50—$28.50; 7.51-8—$29.00; 8-8.50—$29.50; 8.51-9—$30.00; 9-9.50—$30.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Imported dead - burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Do. domestic	40.00
Do., f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Quickset magnesite grains, f.o.b. Chewelah, Wash., net, bulk	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$47.00
Chem. bonded chrome	47.00
Magnesite brick	67.00
Chem. bonded magnesite	57.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	20.00
Do. barge	20.00
No. 2 lump	21.00-22.00

Ferroalloy Prices

Ferromanganese, 78-82%, tidewater, duty pd. $100.00
Do., del. Pittsburgh 105.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 32.00
Do., 26-28%, Palmerton 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 80.50
Do., 75 per cent 126.00
Spot, $5 a ton higher.

Silicomanganese, 2½ c. 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $11 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 2.25

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 10.50c
Do., ton lots 11.25c
Do., less-ton lots 11.50c
67-72% carloads, 2% carbon, per lb. contained chrome 16.50c
Do., ton lots 17.25c
Do., less-ton lots 17.75c

	Carloads	Ton lots	Less ton
2% carb.	16.50c	17.25c	17.75c
1% carb.	17.50c	18.25c	18.75c
0.10% carb.	19.50c	20.25c	20.75c
0.20% carb.	18.50c	19.25c	19.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, any quantity, freight allowed, lb. 7.25c
Do, spot carlots, bulk 7.50c
Do, ton lots 8.00c
Do., less-ton lots 8.25c

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.75
Do, smaller lots 2.85

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 80.00c
Do, spot 85.00c
88% chrome, contract 79.00c
Do, spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads freight allowed, ton $69.50
Carload, spot 74.50
Less-ton lots, lb. 3.75c

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots 2.75
Do, under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.78	4.86	3.46	4.13	8.63	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.23	3.51	4.09	8.59	7.19
Philadelphia	3.85	3.85	4.35	3.55	3.55	5.25	3.55	4.55	4.68	3.51	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	4.90	5.05	....	4.05	....	....
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	6.40	4.20	6.30	5.00	4.45	6.15	10.40	9.55
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.75	3.35	3.65	8.35	6.95
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.55	4.62	3.20	3.75	8.15	6.75
Detroit	3.58	3.68	3.68	3.75	3.80	5.42	3.43	4.50	4.84	3.40	3.80	8.45	7.05
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	....	4.57	3.45	4.00	8.50	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.35	4.30	4.85	3.50	3.75	8.15	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.60	4.95	4.50	3.83	4.34	8.84	7.44
Milwaukee	3.63	3.73	3.73	3.68	3.68	5.28	3.48	4.43	4.73	....	3.88	8.38	6.98
St. Louis	3.62	3.72	3.72	3.47	3.47	5.07	3.38	4.32	4.52	3.61	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Memphis	3.90	4.00	4.00	3.95	3.95	5.71	3.75	....	5.00	....	4.31	....	....
Chattanooga	3.80	3.90	3.90	3.85	3.85	5.80	3.65	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.54	4.54	4.33	4.33	5.93	4.24	....	5.19	....	4.69	....	....
Birmingham	3.50	3.60	3.60	3.55	3.55	5.88	3.35	....	4.85	....	4.43	....	....
New Orleans	3.85	4.65	4.65	3.80	3.80	5.75	4.10	....	4.60	5.00	5.10	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
*Seattle	4.00	3.85	5.20	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.65	6.35	4.00	4.00	6.40	3.75	6.40	5.15	....	6.15	10.65	9.80
San Francisco	4.00	4.35	6.00	4.00	4.00	5.60	3.75	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	...
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.35	5.95	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.63	4.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.78	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds, except 0-1999 pounds (hot rolled sheets only) in New York; 300-1999 pounds in Los Angeles; 0-299 pounds (hoops only) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York and St. Louis; 450-3749 pounds in Boston; 500-1499 pounds in Buffalo; 1000-1999 pounds in Philadelphia, Baltimore; 300-4999 pounds in San Francisco and Portland; any quantity in Twin Cities.

Galvanized Sheets: Base, 0-1499 pounds in New York, Tulsa; 150-1499 pounds in Cleveland, Milwaukee, Pittsburgh, Baltimore, Norfolk; 150-1049 pounds in Los Angeles; 300-4999 pounds in Portland, San Francisco; 450-3749 pounds in Boston; 500-1499 pounds in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, St. Louis; 1500 pounds and over in Chattanooga, Philadelphia; any quantity in Twin Cities.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco; 1000 pounds and over on alloy.

SAE Hot Rolled Alloy Bars: Base, 1000 or 2000 pounds and over, except 0-4999 pounds in San Francisco; 0-1999 in Portland.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, Oct. 26

Export Prices f. o. b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Quoted in dollars at current value	Continental Channel or North Sea ports, gross tons **Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	$20.05 5 0 0	$18.32	2 3 0
Basic bessemer	....	19.59	2 6 0
Hematite, Phos. .03-.05	21.05 5 5 0	.....	.....
Billets	$29.57 7 7 6	$38.34	4 10 0
Wire rods, No. 5 gage	45.61 11 7 6	46.86	5 10 0
Standard rails	$38.09 9 10 0	$48.99	5 15 0
Merchant bars	1.97c 11 0 0	2.50c	6 11 6
Structural shapes	1.79c 10 0 0	2.42c	6 7 6
Plates, †¼ in. or 5 mm.	1.96c 10 18 9	2.96c	7 16 0
Sheets, black, 24 gage or 0.5 mm.	2.33c 13 0 0	3.28c	8 12 6°
Sheets, gal., 24 ga., corr.	2.82c 15 15 0	3.52c	9 5 0
Bands and strips	2.19c 12 5 0	2.35c to 2.50c	6 3 6 to 6 11 6
Plain wire, base	3.49c 19 10 0	3.04c	8 0 0
Galvanized wire, base	4.16c 23 5 0	3.61c to 3.66c	9 10 0 to 9 12 6
Wire nails, base	....	3.52c	9 5 0
Tin plate, box 108 lbs.	$5.21 to 5.61 1 6 0 to 1 8 0		.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d	French Francs		Belgian Francs		Reich §§Mark
Fdy. pig iron, Si. 2.5	$19.85 4 19 0(a)	$15.50	679.30	$25.05	750	$25.20	63
Basic bess. pig iron	18.55 4 12 6(a)	.....	.....	.....	...	27.80	(b)69.50
Furnace coke	4.61 1 4 2	5.13	225	6.75	202	7.60	19
Billets	29.57 7 7 6	23.46	1,029	28.72	860	38.60	96.50
Standard rails	1.70c 9 10 0	1.41c	1,405	2.06c	1,375	2.38c	132
Merchant bars	2.08c 11 12 0††	1.30c	1,304	1.65c	1,100	1.98c	110
Structural shapes	1.86c 10 8 0††	1.27c	1,268	1.65c	1,100	1.93c	107
Plates, †¼-in. or 5 mm.	1.96c 10 19 3††	1.65c	1,650	2.06c	1,375	2.29c	127
Sheets, black	2.64c 14 15 0§	1.96c	1,958‡	2.36c	1,575‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.09c 17 5 0	2.85c	2,850	4.05c	2,700	6.66c	370
Plain wire	3.49c 19 10 0	2.00c	2,000	2.48c	1,650	3.11c	173
Bands and strips	2.21c 12 7 0††	1.44c	1,444	1.95c	1,300	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. §§Last prices, no current quotations.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	17.00
Bos. dock No. 1 exp.	17.50-18.00
New Eng. del. No. 1	18.00-19.00
Buffalo, No. 1	21.00-21.50
Buffalo, No. 2	19.00-19.50
Chicago, No. 1	18.50-19.00
Chicago, auto, no alloy	17.00-17.50
Chicago, No. 2 auto	15.50-16.00
Cincinnati dealers	16.00-16.50
Cleveland, No. 1	19.50-20.00
Cleveland, No. 2	18.50-19.00
Detroit, No. 1	†16.00-16.50
Detroit, No. 2	†15.00-15.50
Eastern Pa., No. 1	21.00-21.50
Eastern Pa., No. 2	19.50-20.00
Federal, Ill.	16.00-16.50
Granite City, R. R.	17.00-17.50
Granite City, No. 2	16.00-16.50
Los Angeles, No. 1	14.50-15.00
Los Angeles, No. 2	13.50-14.00
L. A., No. 1 f.a.s.	16.00-17.00
L. A., No. 2 f.a.s.	15.00-16.00
N. Y. dock No. 1 exp.	17.50
Pitts., No. 1 (R. R.)	24.50-25.00
Pittsburgh, No. 1	22.50-23.00
Pittsburgh, No. 2	21.00-21.50
St. Louis, R. R.	18.00-18.50
St. Louis, No. 2	16.00-16.50
San Francisco, No. 1	15.50-16.00
San Francisco, No. 2	14.50-15.00
Seattle, No. 1	14.50-15.50
Toronto, dirs., No. 1	11.25
Valleys, No. 1	21.00-21.50

COMPRESSED SHEETS

Buffalo, new	19.00-19.50
Chicago, factory	18.00-18.50
Chicago, dealers	16.50-17.00
Cincinnati, dealers	15.50-16.00
Cleveland	19.00-19.50
Detroit	†17.50-18.00
E. Pa., new mat.	21.00-21.50
E. Pa., old mat.	18.00-18.50
Los Angeles	12.00-12.50
Pittsburgh	22.50-23.00
St. Louis	13.50-14.00
San Francisco	14.00-14.50
Valleys	20.50-21.00

BUNDLED SHEETS

Buffalo, No. 1	19.00-19.50
Buffalo, No. 2	16.50-17.00
Cleveland	15.00-15.50
Pittsburgh	21.00-21.50
St. Louis	12.00-12.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	14.00-14.50
Cincinnati dealers	11.00-11.50
Detroit	†12.50-13.00
St. Louis	10.50-11.00
Toronto, dealers	6.50

BUSHELING

Buffalo, No. 1	19.00-19.50
Chicago, No. 1	17.00-17.50
Cincin., No. 1, deal.	12.00-12.50
Cincinnati, No. 2	5.00- 5.50
Cleveland, No. 2	12.50-13.00
Detroit, No. 1, new	†16.00-16.50
Valleys, new, No. 1	18.50-19.00
Toronto, dealers	5.00- 5.50

MACHINE TURNINGS (Long)

Birmingham	7.50
Buffalo	13.00-13.50
Chicago	11.50-12.00
Cincinnati, dealers	7.00- 7.50
Cleveland, no alloy	11.50-12.00
Detroit	†9.50-10.00
Eastern Pa.	14.00-14.50
Los Angeles	4.00- 5.00
New York	†8.00- 8.50
Pittsburgh	14.00-14.50
St. Louis	9.00- 9.50
San Francisco	5.00
Toronto, dealers	5.50- 6.00
Valleys	12.50-13.00

SHOVELING TURNINGS

Buffalo	15.00-15.50
Cleveland	12.50-13.00
Chicago	11.50-12.00
Chicago, spcl, anal.	12.50-13.00
Detroit	†12.50-13.00
Pitts., alloy-free	17.50-18.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†6.75- 7.50
Buffalo	11.50-12.00
Cincinnati, dealers	6.00- 6.50
Cleveland	12.00-13.00
Eastern Pa.	12.50-13.00
Detroit	†9.50-10.00
New York	†8.00- 8.50
Pittsburgh	13.00-13.50
Toronto, dealers	5.50- 6.00

AXLE TURNINGS

Buffalo	17.50-18.00
Boston district	†10.50-11.00
Chicago, elec. fur	18.00-18.50
East. Pa. elec. fur.	19.50-20.00
St. Louis	13.50-14.00
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.00- 7.50
Boston dist. chem.	†9.00- 9.50
Buffalo	11.50-12.00
Chicago	11.00-11.50
Cincinnati, dealers	6.00- 6.50
Cleveland	12.00-13.00
Detroit	†9.50-10.00
E. Pa., chemical	14.50-15.00
New York	†8.00- 8.50
St. Louis	8.50- 9.00
Toronto, dealers	5.00- 5.50

RAILROAD SPECIALTIES

Chicago	21.50-22.00

ANGLE BARS—STEEL

Chicago	21.00-21.50
St. Louis	21.00-22.00

SPRINGS

Buffalo	23.50-24.00
Chicago, coil	22.00-22.50
Chicago, leaf	21.00-21.50
Eastern Pa.	26.00-26.50
Pittsburgh	27.50-28.00
St. Louis	21.00-21.50

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Buffalo	23.50-24.00
Chicago (3 ft.)	21.50-22.00
Chicago (2 ft.)	22.00-22.50
Cincinnati, dealers	23.00-23.50
Detroit	†24.50-25.00
Pitts., 3 ft. and less	27.50-28.00
St. Louis, 2 ft. & less	21.50-22.00

STEEL RAILS, SCRAP

Boston district	†15.50-16.00
Buffalo	21.00-21.50
Chicago	18.50-19.00
Cleveland	22.00-22.50
Pittsburgh	24.50-25.00
St. Louis	18.00-18.50
Seattle	18.00-18.50

FROGS, SWITCHES

Chicago	18.50-19.00
St. Louis, cut	18.00-18.50

ARCH BARS, TRANSOMS

St. Louis	20.00-20.50

PIPE AND FLUES

Chicago, net	13.50-14.00
Cincinnati, dealers	12.50-13.00

RAILROAD GRATE BARS

Buffalo	14.00-14.50
Chicago, net	12.75-13.25
Cincinnati, dealers	9.50-10.00
Eastern Pa.	18.00-18.50
New York	†13.00-13.50
St. Louis	13.00-13.50

RAILROAD WROUGHT

Birmingham	11.00-11.50
Boston district	†9.50-10.00
Eastern Pa., No. 1	21.50-22.00
St. Louis, No. 1	12.75-13.25
St. Louis, No. 2	17.50-18.00

FORGE FLASHINGS

Boston district	†11.75-12.00
Buffalo	19.00-19.50
Cleveland	18.50-19.00
Detroit	†15.00-15.50
Pittsburgh	21.00-21.50

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	22.00-22.50

LOW PHOSPHORUS

Cleveland, crops	22.50-23.00
Eastern Pa., crops	25.50-26.00
Pitts., billet, bloom, slab crops	29.00-29.50

LOW PHOS. PUNCHINGS

Buffalo	22.00-22.50
Chicago	22.00-22.50
Cleveland	22.00-22.50
Eastern Pa.	26.00-26.50
Pittsburgh	25.50-26.00
Seattle	15.00
Detroit	†17.50-18.00

RAILS FOR ROLLING
5 feet and over

Birmingham	20.00
Boston	†17.00-17.50
Chicago	21.50-22.00
New York	†18.00-18.50
Eastern Pa.	24.00-24.50
St. Louis	20.00-20.50

STEEL CAR AXLES

Birmingham	20.00-21.00
Boston district	†18.50-19.00
Chicago, net	22.00-22.50
Eastern Pa.	25.00-25.50
St. Louis	22.00-22.50

LOCOMOTIVE TIRES

Chicago (cut)	21.00-21.50
St. Louis, No. 1	17.50-18.00

SHAFTING

Boston district	†18.50-19.00
New York	†18.00-18.50
Eastern Pa.	24.50-25.00
St. Louis, 1¼-3¾"	19.50-20.00

CAR WHEELS

Birmingham	13.50-14.00
Boston dist., iron	†15.00-15.50
Buffalo, steel	23.50-24.00
Chicago, iron	19.00-19.50
Chicago, rolled steel	20.50-21.00
Cincin., iron, deal.	18.50-19.00
Eastern Pa., iron	22.50-23.00
Eastern Pa., steel	25.50-26.00
Pittsburgh, iron	22.00-22.50
Pittsburgh, steel	27.00-27.50
St. Louis, iron	20.00-20.50
St. Louis, steel	21.00-21.50

NO. 1 CAST SCRAP

Birmingham	13.00-13.50
Boston, No. 1 mach.	†16.50-17.00
N. Eng. del. No. 2	17.00-17.50
N. Eng. del. textile	20.00-25.00
Buffalo, cupola	19.00-19.50
Buffalo, mach.	20.00-20.50
Chicago, agri. net	14.50-15.00
Chicago, auto net	16.50-17.00
Chicago, railroad net	15.50-16.00
Chicago, mach. net	16.50-17.00
Cincin., mach. deal.	19.00-19.50
Cleveland, mach.	20.00-21.00
Detroit, cupola, net	†16.50-17.00
Eastern Pa., cupola	22.00-23.00
E. Pa., mixed yard	19.00-19.50
Los Angeles, net	15.00-16.50
Pittsburgh cupola	22.50-23.00
San Francisco, del.	12.50-13.00
Seattle	16.00-16.50
St. Louis, cupola	15.00-15.50
St. Louis agri. mach.	16.00-16.50
St. L., No. 1 mach.	17.00-17.50
San Francisco	14.50-15.00
Toronto, No. 1 mach., net, dealers	16.00-16.50

HEAVY CAST

Boston dist. break.	†14.50-14.75
New England, del.	16.00-17.00
Buffalo, break	16.50-17.00
Cleveland, break, net	15.25-15.75
Detroit, auto net	†17.50-18.00
Detroit, break.	†14.50-15.00
Eastern Pa.	20.00-20.50
Los Ang., auto, net.	14.50
New York, break	†16.00-16.50
Pittsburgh, break	18.50-19.00

STOVE PLATE

Birmingham	9.00-10.00
Boston district	†14.00-14.50
Buffalo	15.00-15.50
Chicago, net	12.00-12.50
Cincinnati, dealers	10.25-10.75
Detroit, net	†11.00-11.50
Eastern Pa.	18.00-18.50
New York, fdy.	13.00-13.50
St. Louis	12.00-12.50
Toronto dealers, net	11.00-11.50

MALLEABLE

Birmingham, R. R.	14.00-15.00
New England, del.	11.50-12.50
Buffalo	21.50-22.00
Chicago, R. R.	21.00-21.50
Cincin., agri., deal.	15.50-16.00
Cleveland, rail	24.00-24.50
Eastern Pa., R. R.	21.50-22.00
Los Angeles	12.50
Pittsburgh, rail	23.50-24.00
St. Louis, R. R.	17.00-17.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbessemer	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbessemer	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	9.00-10.00

Foreign Ore
(Prices nominal)

Cents per unit, c.i.f. Atlantic

Manganiferous ore, 45-55% Fe., 6-10% Mn.	14.00-15.00
North African low phos.	14.00
Spanish, No. African basic, 50 to 60%	14.00
Chinese wolframite, short ton unit, duty paid	$23.75-25.00
Scheelite, imp.	$25.00-26.00
Newfoundland fdry. 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$25.00-26.00

Manganese Ore

Prices not including duty, cents per unit cargo lots.

Caucasian, 50-52%	48.50-50.00c
So. African, 50-52%	48.50-50.00c
Indian, 49-50%	nom.
Brazilian, 43-45%	nom.

Molybdenum

Sulphide concentrates, per lb. Mo. contained, mines.	$0.75

Sheets, Strip

Sheet and Strip Prices, Page 76, 77

Pittsburgh — Production has leveled off, most units now active being practically at capacity. Orders also have moderated, although backlogs are sustained since incoming tonnage is slightly ahead of production. Automotive strikes have relieved some of the pressure for delivery to that industry. Substantial export orders continue available, but heavy domestic demand precludes acceptance of much foreign business.

Cleveland—Additional first quarter business is being booked despite absence of definite prices. Mill capacity is filled for the remainder of the year. Pressure for delivery shows no slackening.

Boston—An increasing volume of narrow cold strip is being booked at open prices for first quarter shipment, capacity for the remainder of the year being well engaged. Only in cases where emergencies exist among regular customers are mills taking limited tonnage for shipment before end of the year. On regular sizes and widths, hot strip deliveries are reasonably prompt for cold rollers seeking usual requirements. Sheet demand is steady.

New York — Buying is brisk, largely for delivery next year at unnamed prices. Some cold-finished sheet producers have little tonnage to offer before late February. Hot-rolled sheets still are available in some quarters within five weeks, but at premiums of $5 and higher. Some export buying, particularly by South America, has been done in black sheets at 3.55c f.a.s. and higher.

Demand for cold strip is heavier, although little rolling capacity is open for delivery this quarter. As a result more tonnage is being booked for next quarter at open prices. Mills in most instances are at capacity.

Philadelphia — Hot-rolled sheets for prompt shipment are bringing premiums of $5 to $7 a ton, with similar premiums reported on galvanized sheets for early delivery. Some consumers requiring material quickly have bought as much as 80 to 100 tons from warehouses.

Buffalo—Heavy backlogs are expected to hold sheet and strip production near the current rate of 85 per cent for remainder of the year. Consumers are placing more tonnage for first quarter.

Cincinnati — Sheet buyers are pressing for delivery, and some orders which appeared speculative a month ago are being specified for nearby needs. Some users are asking earlier shipment than originally scheduled, creating problems for mills.

St. Louis—Sheet and strip production continues at the year's peak. Potential capacity for the remainder of the quarter has been sold, and orders for 1940 are being taken at open prices.

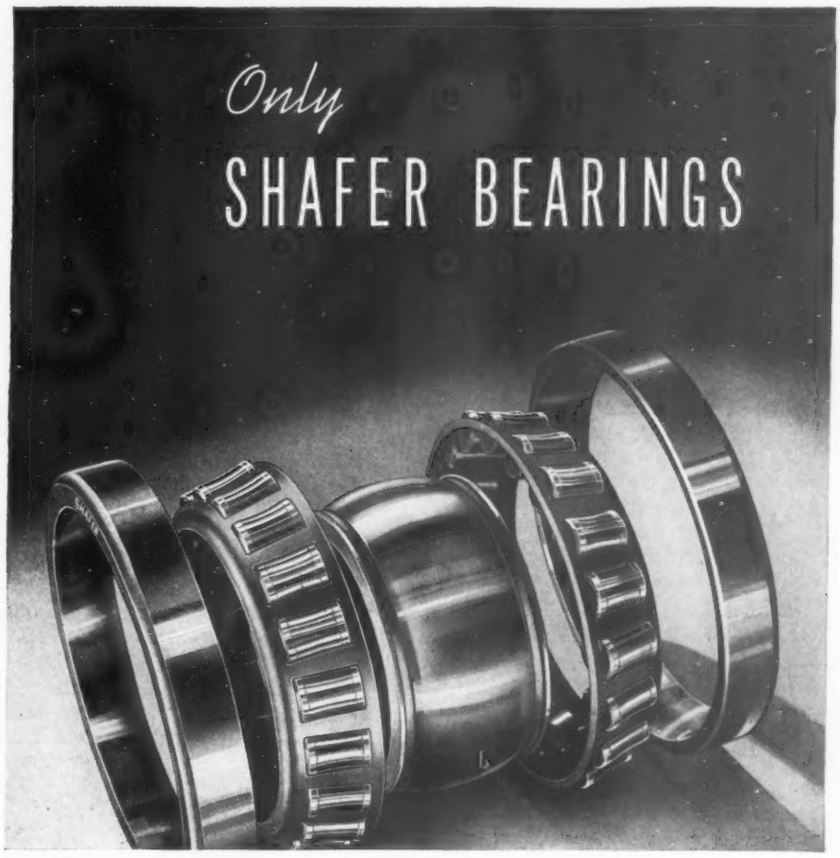
Birmingham, Ala.—Sheet production continues at virtual capacity with demand fairly evenly divided between manufacturers' and roofing sheets. Some restocking is in evidence, although most of the output is going directly into consumer hands.

Plates

Plate Prices, Page 76

Boston—Demand is moderately heavier without the aid of much specified work. Miscellaneous fabricators are better consumers, and more tonnage is being placed at the recent $5 advance to 2.35c, base. Shipyard releases are maintained, with some gain shown in railroad specifications. Boiler and structural shop needs continue light, although some of the former are estimating more tonnage.

New York—Railroad requirements



Only Shafer Bearings offer this effective self-alignment within the bearing itself. The inner race is a true spherical element, free to move without altering the contact of the concave rollers. Efficient bearing operation is maintained under all conditions. Only Shafer design combines: 1. Integral self-alignment; 2. Capacity for radial, thrust, or combined radial-thrust loads; 3. Simple adjustability.

CONCAVEX

Available in a full range of sizes: Pillow Blocks • Flange Units • Take-up Units • Cartridge Units • Hanger Boxes • Flange-Cartridge Units • Duplex Units • Conveyor Rolls • Radial-thrust Roller Bearings.

SHAFER BEARING CORPORATION
35 East Wacker Drive, Chicago, Illinois

SHAFER SELF-ALIGNING ROLLER BEARINGS

dominate plate demand, with considerable tonnage being figured. Some producers are sold out for the quarter, but certain mills have tonnage available within four or five weeks at the $5 increase. Export prices are steady, with some business done at 2.70c and 2.80c, f.a.s., for European and South American shipment.

Philadelphia—Smaller mills still are offering deliveries within two to three weeks at a $5 premium, but the average is closer to 10 to 12 weeks. Independent producers indicate the $5 premium will be continued even though a smaller advance is announced by leading interests for first quarter. Specifications are active from railroad, shipbuilders and tank fabricators.

Birmingham, Ala. — Plates are active. Considerable backlog is in hand, due to orders for car building and shipbuilding requirements.

Seattle — Fabricators report a fair run of small contracts requiring less than 100 tons of materials, including tank, boiler and smokestack jobs. An unstated tonnage is involved in seven 72-inch welded plate pipes for a Salt Lake City, Utah, aqueduct.

San Francisco—Demand for plates is far from active and few inquiries of size are up. Unnamed interests secured 100 tons for a tug for the Columbia River Towing Co., Portland, Oreg. Awards this year aggregate 89,306 tons, compared with 37,292 tons for the corresponding period in 1938.

Plate Contracts Placed

160 tons, two oil tanks, Standard Oil Co. of Indiana, Winona, Minn., to Chicago Bridge & Iron Co., Chicago.

Plate Contracts Pending

100 tons, 20-inch shore pipe, United States engineer office, Sacramento, Calif.; bids Oct. 31.

Unstated, seven 72-inch welded plate pipes for Salt Lake City aqueduct; bids to Denver, Nov. 2.

Bars

Bar Prices, Page 76

Pittsburgh—Merchant bar producers generally are not accepting additional business for this quarter, although orders have not been sufficiently clarified to insure filled schedules, and some more tonnage may possibly be squeezed into output before Dec. 31. Recent increase in concrete bar prices is taken in many quarters as an indication of similar action in merchant bars for first quarter.

Cleveland—First quarter business is heavier. Mills are accepting practically no tonnage for shipment before January since only small lots at most can be squeezed into December schedules. Capacity until then is fully engaged. Heavy demand from cold-drawn bar producers reflects previous low stocks of these interests and increased automotive needs.

Chicago — Production is geared about as high as available raw material will allow. Demand has been exceedingly large. Orders being taken now are for first quarter delivery at prices prevailing then, although certain sizes of alloy bars might possibly still be sandwiched in for this quarter.

Boston — Carnegie-Illinois Steel Corp., has been awarded an additional tonnage of chromium-molybdenum steel bars for the Springfield, Mass., arsenal, the latter expanding production of semi-automatic rifles. Price was 9.32c, delivered, bids Oct. 9. Merchant bar specifications are well maintained and alloy stock is slightly more active with many consumers pressing for deliveries.

New York—Most leading producers of hot-rolled bars are sold for remainder of the year, but cold-drawn bar sellers still have some tonnage available. Demand from railroads and machinery and equipment builders remains outstanding. Warehouses apparently have stocks in better shape, now being less insistent for deliveries.

Philadelphia—Deliveries are extended further on heavy railroad specifications for repair programs, warehouse replacement needs and miscellaneous buying.

Birmingham, Ala.—Manufacturers of agricultural implements are taking a greater tonnage which has sent production up to better than 80 per cent.

Pipe

Pipe Prices, Page 77

Pittsburgh — Pipe production is gaining, with demand for standard pipe good and oil country business steady. Mechanical tubing is moving actively to the automotive industry, and pressure tubing is in better demand. Consigned stocks of merchant pipe are low and sellers are calling for heavier shipments.

Boston—Pressure for cast pipe deliveries has eased slightly and the district foundry has reduced operations one day, to a five-day week. Close to 450 tons is pending for Framingham, Worcester and Clinton, Mass.; bids in. Additional commitments against annual contracts, which have been beyond expectations, are in prospect before the end of the year. Merchant steel pipe buying has slipped slightly, but several large heating and plumbing contracts for housing projects are in sight.

New York—Merchant pipe demand apparently is past its fall peak, although another flurry may develop with cold weather. Resale prices continue unsettled. Producers still can make deliveries this year on new business.

Cast pipe buying has slowed down, utilities having covered heavily and municipal requirements being off seasonally. In some instances buyers have enlarged increased releases against original tonnage. Export inquiry is brisk and some producers are in a position to take more of this business at premiums over domestic prices.

Birmingham, Ala. — Largely because of miscellaneous orders in small lots, pipe production is enabled to maintain its schedule of four to five days a week. Inquiries, for small lots, are numerous, considerable tonnage going to the Pacific coast.

Seattle — Demand for cast iron pipe continues steady for small lots. Prospects are fair for the balance of the year as several projects are contemplated by cities in Washington and Oregon. Yakima, Wash., is considering a $51,166 extension. Redondo Beach, Wash., has WPA approval for a proposed $45,000 improvement, including two storage tanks and 22,000 feet of steel pipe.

San Francisco — Apparently a number of municipalities anticipate higher prices after the first of the year and are coming into the market for future requirements. Awards totaled 3631 tons and brought the year's aggregate to 34,139 tons, compared with 25,853 tons for the same period a year ago.

Cast Pipe Placed

2230 tons, 6 to 12-inch, Los Angeles; 1300 tons to United States Pipe & Foundry Co., Burlington, N. J., 470 tons to American Cast Iron Pipe Co., Birmingham, Ala., and 460 tons to National Cast Iron Pipe Co., Birmingham, Ala.

500 tons, various sizes, for Bremerton, Wash., to H. G. Purcell, Seattle, for United States Pipe & Foundry Co., Burlington, N. J.

230 tons, 6 to 10-inch, for Vancouver, Wash., to H. G. Purcell, Seattle, for United States Pipe & Foundry Co., Burlington, N. J.

220 tons, 6 to 12-inch, Arcadia, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

150 tons, 8-inch, Springfield, Mass., through procurement division, treasury department, Boston.

Cast Pipe Pending

726 tons, 3 to 6-inch, San Francisco; bids Oct. 30.

261 tons, 2 to 8-inch, water district No. 55, Seattle; bids opened.

122 tons, 6 to 12-inch, Sunnyside, Wash.; bids opened.

100 tons, 4 to 12-inch, Compton, Calif.; American Cast Iron Pipe Co., Birmingham, Ala., low.

Wire

Wire Prices, Page 77

Pittsburgh—Demand is increasing, mostly in releases. New business generally is being taken on the basis of price at time of delivery. Merchant markets are active, with prices reported holding well. Some delivery problems are being met in manufacturers' wire, which accounts for most current production.

Cleveland — Buyers continue to seek early delivery against orders, but new business has slackened as a result of prior coverage. Heavy mill schedules are assured for the rest of the year, capacity being largely engaged by orders on hand.

Chicago—Producers are unable to take additional business for delivery this quarter. Little demand is felt for position on first quarter books, buyers having been assured their requirements will be accommodated and are awaiting price settlement before making commitments. Production is near capacity and going to widely scattered types of users. Road mesh demand has passed its peak but still is heavy.

Boston—Wire business, temporarily at least, has resolved itself largely into a problem of deliveries. Consumers continue to press for shipments, and operating difficulties are intensified by diversification of tonnage. Most volume now being taken is at open prices for first quarter shipment.

New York—Pressure for wire deliveries is unabated. Finishing departments are operating full in many instances and backlogs, sufficient to hold this peak during the remainder of the year, are made up of widely diversified products. Buying has slackened, partly due to lengthening deliveries, but a substantial volume is being booked for first quarter at open prices.

Tin Plate

Tin Plate Prices, Page 76

Tin plate operations hold at 95 per cent. Starting of additional mill capacity is thought unlikely, idle units involving high operating costs. However, new facilities are being built which will be available before another year is past. Good demand continues for general line cans, with the export market also active. Little first quarter tonnage has been booked.

Rails, Cars

Track Material Prices, Page 77

Railroad buying continues, rails being booked last week to a total of more than 160,000 tons, led by 25,000 tons for the Baltimore & Ohio and 69,700 for the Atchison, Topeka & Santa Fe. New York Central opened bids Oct. 25 on its rail requirements and is expected to close soon on at least 50,000 tons.

Car buying resulted in booking of 3197 units, the Baltimore & Ohio also leading in purchases, with 1500.

New York Central will open bids Nov. 8 on an unstated number of diesel switch engines and Minneapolis, Northfield & Southern is inquiring for three Diesel-electric locomotives.

Car Orders Placed

Baltimore & Ohio, 1500 cars; 1000 hopper cars going to the Bethlehem Steel Co., Bethlehem, Pa., and 500 70-ton gondolas to American Car & Foundry Co., New York; 500 box cars expected to be placed momentarily.

Louisiana & Arkansas, 200 box cars, to American Car & Foundry Co., New York.

Navy, 32 cars, comprising fifteen 50-ton flat cars, eight 50-ton box cars, eight 50-ton flat-bottom gondola cars, and one 50-ton hopper car, to American

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Behind the Scenes with STEEL

A Great Show

■ Two years ago, the week of the Metal Show in Atlantic City, the stock market broke out in a rash that dampened many a visitor's spirit. At Detroit in '38, the Peace of Munich offered little encouragement in the fall of a slow and unexciting business year. But last week, a long overdue enthusiasm combined with a backlog of orders at plants back home to put across the biggest, busiest and best Metal Show the industry has ever seen.

Rats to Gardens

■ The International Amphitheater at the Union Stock yards had every nook and cranny jam-packed with some 260 exhibits ranging from an industrial psychology display of trained rats, to the beautiful formal garden of the U. S. Steel Corp., which, incidentally, we understand, is to be moved to the Smithsonian institute.

Pleasing Aroma

■ It was a hectic week with the crowds packed in the aisles at times like the cattle at the Stock Yard ramps across the tracks. But it was a restricted crowd—anxious to find out what was new—buoyed up with talk of busy plants and limited capacities.

Steel's Other Booth

■ Whitey Maurath, whose harem adorned STEEL's October 16 front cover, soon became known as "the little man who wasn't there," his bare booth, shown here, explaining business was just too damn good to break away. Whitey, however, couldn't miss that Welding Society stag party at the Stevens—but now we guess he wished he had.

Highlights

■ Among dozens of outstanding displays we personally like Republic's classical replica of the Parthenon, Lindbergh Steel Treating's show of the 1890's and that miniature laboratory shown by J & L. Spencer Turbine kept their ping pong ball bouncing on air as they have for years and the Aluminum Co. of America sponsored a continuous double feature movie starring Al. U. Minum. There were all sorts of gadgets passed out and we picked up a few for Ann and we also took time to run downtown to get her first little velvet party dress.

And So To Bed

■ The local hot spots came in for their share after closing hours and lights burned late in packed hotel rooms as the boys really went to town. The best story we heard (that Jim Farley will pass through the mails) was about the two Scotchmen at the bar ready to have a drink. "Sandy," one says, "I was out a huntin' th' other day and I shot a great big bear right smack in the yours." "What's yours?" asks Sandy and quick the other boy answers—"Well, I think I'll have a Scotch and soda and many thanks!" And believe it or not it works. SHRDLU

—The Market Week—

Car & Foundry Co., New York City.

Northern Pacific, 1400 cars; 500 box cars, 150 hopper cars and 100 service cars going to the American Car & Foundry Co., New York, 500 box cars to the Pullman-Standard Car Mfg. Co., Chicago, and 150 hopper cars to the General American Transportation Corp.

Tennessee Central, 65 hopper cars, to American Car & Foundry Co., New York City.

Car Orders Pending

St. Louis Southwestern, 218 cars, including 100 coal, 56 flat, 50 fifty-foot automobile, 12 steel cabooses; court authority granted for purchase of materials for building in own shops; 470 tons 85-pound rail included.

Rail Orders Placed

Atchison, Topeka & Santa Fe, 69,700 tons, placed with Carnegie-Illinois Steel Corp., Pittsburgh, the Bethlehem Steel Co., Bethlehem, Pa., the Inland Steel Co., Chicago, and Colorado Fuel & Iron Co., Denver; in addition, 27,000 tons of accessories also were placed.

Baltimore & Ohio, 25,000 tons, 11,600 tons 131-pound rail and 4000 tons of 112-pound rail, going to Carnegie-Illinois Steel Corp., Pittsburgh; 8400 tons of 151-pound rail to the Bethlehem Steel Co., Bethlehem, Pa., and 1000 tons of 131-pound rail to the Inland Steel Co., Chicago.

Chilean State Railways, 5000 tons of 90-pound rail, to Bethlehem Steel Co., Bethlehem, Pa.

Erie, 17,429 tons; 2269 tons to Bethlehem Steel Co., Bethlehem, Pa., 13,949 tons to Carnegie-Illinois Steel Corp., Pittsburgh, 1211 tons to Inland Steel Co., Chicago.

Missouri Pacific, 8755 tons to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; 27,100 tons to other producers.

Spokane, Portland & Seattle, 10,000 tons to Colorado Fuel & Iron Co., Denver.

Locomotives Placed

Central of Brazil, noted in recent issue as closing on the 17 locomotives of 2-10-4 type to American Locomotive Co., New York, and Baldwin Locomotive Works, Eddystone, Pa., placed seven with the former and ten with the latter.

Sorocabana Railway, Brazil, 4-10-2 type locomotives, to American Locomotive Co., New York City.

Locomotives Pending

Minneapolis, Northfield & Southern, three diesel-electric locomotives, pending.

New York Central, diesel switch engines; bids Nov. 8.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 77

Bolt and nut producers are able to furnish delivery on practically all grades this quarter, despite continued heavy specifications. Production is near 80 per cent, new high for the year to date. Freight car and automotive needs are expected to pace an active demand the re-

mainder of the year. At least a small price increase is looked for next quarter.

Shapes

Structural Shape Prices, Page 76

Pittsburgh — Inquiries are mostly for private construction, although there continues a normal percentage of public works jobs. Largest of recent awards is 1900 tons for a building for an aircraft interest. Structural mills generally are not crowded.

Cleveland—Mills are being pressed for shape deliveries, largely the result of increased activity in small building projects and efforts of fabricators to hasten larger jobs already under way. Inquiries for major types of construction are light.

Chicago—Shape demand is active, aided materially by requirements of railroad carbuilders. Inquiries for fabricated shapes are quiet, and most of recent awards have been small.

Boston—Increase in small bridge inquiry for Massachusetts is outstanding, bids closing Oct. 30 and 31 on seven structures taking several hundred tons. Most are stringer spans. Awards are light. Inquiry is down, but more small industrial plant construction is being figured at somewhat stronger prices for fabrication.

New York—While structural steel being estimated in the immediate New York district is light, bridges upstate and in New Jersey take 7500 tons, only a fraction having been bid. As public work continues to dwindle, a good part of the slack is being taken up by more small industrial plant buildings and additions. Such construction is above expectations.

Philadelphia—New work is lighter but volume for the entire eastern seaboard is improving. A Panama canal job will require 5500 tons of shapes and plate. Awards include 1400 tons for a subassembly shop, Norfolk navy yard.

Shape Awards Compared

	Tons
Week ended Oct. 28	17,827
Week ended Oct. 21	24,104
Week ended Oct. 14	19,927
This week, 1938	30,773
Weekly average, year, 1938	21,568
Weekly average, 1939	22,615
Weekly average, September	27,395
Total to date, 1938	857,874
Total to date, 1939	972,444

Includes awards of 100 tons or more.

Buffalo — Twelve grade crossing eliminations, costing $2,569,000, have been announced for western New York in the public service commission's 1940 program. Awards include 340 tons for a crossing at Groveland, N. Y.

Seattle—Shops are busy with current orders although nothing of importance is up for figures at the moment. Bellingham, Wash., will receive bids Nov. 2 for 14 sluice gates, hoists and accessories for a water system intake.

San Francisco—Structurals placed totaled 3772 tons, bringing the aggregate for the year to 129,697 tons, compared with 129,173 tons for the same period last year. Consolidated Steel Corp. was awarded 1285 tons for a bridge at First and Beverly boulevard, Los Angeles.

St. Louis—Continued quiet obtains in structural steel. Lettings are light and numerically small. Freight car builders are furnishing best business at the moment.

Shape Contracts Placed

2500 tons, navy seaplane hangars, Alameda, Calif., to Bethlehem Steel Co., Bethlehem, Pa.

1900 tons, building, for Wright Aeronautical Corp., Paterson, N. J., to Republic Steel Corp., Cleveland.

1500 tons, apartment, Fifth avenue and Seventy-fourth street, New York, to Harris Structural Steel Co., New York.

1500 tons, power house, Public Service Electric & Gas Corp., Jersey City, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

1400 tons, sub-assembly shop Norfolk, Va., to Phoenix Bride Co., Phoenixville, Pa., through Ralph H. Herzog, Philadelphia.

1285 tons, bridge at First and Beverly boulevard, Los Angeles, to Consolidated Steel Corp., Los Angeles.

990 tons, rebuilding viaduct, Nickel Plate railroad, Conneaut, O., to American Bridge Co., Pittsburgh.

670 tons, lanlplane hangars, Fairfield, Pensacola, Fla., to Jones & Laughlin Steel Corp., Pittsburgh; Virginia Engineering Co., Newport News, Va., contractor.

545 tons, tube mill building, Wheeling Steel Corp., Benwood, W. Va., to Ingalls Iron Works, Birmingham, Ala.

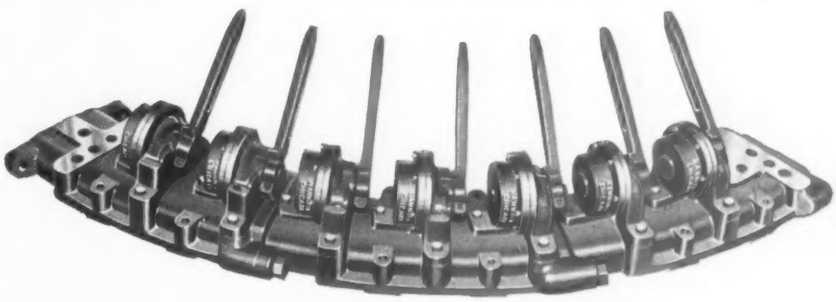
505 tons, Tennessee valley authority, Kentucky dam projects, including 220 tons structural steel, to Nashville Bridge Co., Nashville, Tenn.; 190 tons rolled steel armor, to Duffin Iron Works, Chicago, and 95 tons steel castings, to Blaw-Knox Co., Pittsburgh.

410 tons, building, Monmouth Memorial hospital, Long Branch N. J., to Bethlehem Steel Co., Bethlehem, Pa.

400 tons, state bridge FA-route 135, section 11-F, Monticello, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

375 tons, building, Frankford arsenal, Philadelphia, to Belmont Iron Works, Philadelphia.

340 tons, grade crossing elimination,



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Groveland, Livingston county, New York, to American Bridge Co., Pittsburgh.

285 tons, Klein Memorial building, Bridgeport, Conn., to Lehigh Structural Steel Co., Allentown, Pa., through E. & F. Construction Co., Bridgeport.

270 tons, laboratory, Corning Glass Works, Corning, N. Y., to Leach Steel Corp., Rochester, N. Y.

255 tons, 435.16-foot five-span continuous overpass, Barton, Vt., to American Bridge Co., Pittsburgh; Littleton Construction Co., Littleton, N. H., contractor.

235 tons, bridge X4 of 82-22-26, Detroit, to R. C. Mahon Co., Detroit.

200 tons, crane runway, Milwaukee, for Chicago, Milwaukee, St. Paul & Pacific railroad, to Milwaukee Bridge Co., Milwaukee.

185 tons, bridge, Watersmeet, Mich., to Worden-Allen Co., Milwaukee.

171 tons, building at Fort Mifflin, Philadelphia, to Phoenix Bridge Co., Phoenixville, Pa., through procurement division PWA, Harrisburg, Pa.

165 tons, bridge Sec. 2F, Cornland, Logan county, Illinois, to Midland Structural Steel Co., Cicero, Ill.

160 tons, garage, Sibley, Lindsay & Curr, Rochester, N. Y., to Leach Steel Corp., Rochester.

150 tons, building, Carlisle, Pa., to Reading Steel Products Co., Reading, Pa.

150 tons, state bridge, route 60, section 116-F-1, Cornland, Ill., to Worden-Allen Co., Milwaukee.

140 tons, bridge, Sec. 13F, Versailles, Brown county, Illinois, to Duffin Iron Co., Chicago.

130 tons, cell blocks, Green Haven, N. Y., prison to Belmont Iron Works, Philadelphia, through Amsterdam Building Co., New York.

125 tons, girder spans, Milwaukee, for state, to Lakeside Bridge & Steel Co., Milwaukee.

120 tons, grade crossing elimination, Adams Village, Jefferson county, New York, to American Bridge Co., Pittsburgh, through Richard Hopkins Co., Albany, N. Y.

120 tons, bridge, route 168, Monroe county, Pennsylvania, to American Bridge Co., Pittsburgh; through Primo Marionelli, Scranton, Pa.

111 tons, bearing piles, Chicago subway section S-4B, to Bethlehem Steel Co., Bethlehem, Pa.

110 tons, shop, boiler and utility building, Fort Wright, N. Y., to Haarmann Steel Co., Holyoke, Mass.; Branford Construction Co., Hartford, Conn., contractor.

110 tons, Gleason Works building, Rochester, N. Y., to Genessee Bridge Co., Rochester.

110 tons, operating hoists and equipment, Tionesta dam, Pennsylvania, to Keystone Engineering Co., Pittsburgh, through United States engineer, Pittsburgh.

105 tons, building No. 65, Chemical Construction Co., Pearl River, N. J., to F. C. Schmidt Iron Works, Edgewater, N. J.

100 tons, Crestwood track elevation, Milwaukee, to Lakeside Bridge & Steel Co., Milwaukee.

Shape Contracts Pending

5500 tons, shapes and plates, Panama Canal; bids Nov. 9 to general purchasing officer, Washington.

1500 tons, steel building, Sound View Park project, New York; bids in.

1300 tons, trash racks, etc., Fort Peck dam, Montana, for United States government.

1200 tons, power transmission towers, TVA; bids Nov. 6.

1000 tons, also 400 tons reinforcing bars, aeronautical laboratory, Philadelphia navy yard.

900 tons, psychiatric patients' pavilion, Brooklyn, N. Y., for city of New York.

625 tons, including 100 tons plates, filtration plant, Los Angeles; bids opened.

550 tons, garage, Jamaica, N. Y., for North Shore Bus Co.

550 tons, grade crossing elimination, Union road, Cheektowaga, N. Y.; C. P. Ward & Co., Rochester, N. Y., low on general contract.

500 tons, turret assembly buildings, Norfolk, Va., for United States bureau of yards and docks.

500 tons, laboratory building, Aberdeen proving ground, Aberdeen, Md.

400 tons, stock cellar building, for Tivoli Brewing Co., Detroit.

400 tons, turret assembly shop, Norfolk navy yard; bids Nov. 3.

350 tons, office building, for Mead Johnson & Co., Evansville, Ind.

325 tons, bridge near Stockton, San Joaquin county, California, for county; bids rejected.

300 tons, state bridge, FAP-259-B, Hamilton, Mont.

300 tons, bridge 587, Pueblo, Colo., for Missouri Pacific railroad.

250 tons, state bridge 5583, Robbinsdale, Minn.

225 tons, mill building, for International Paper Co., Palmer, N. Y.

223 tons, bridges, route 6, section 11, Montville and Caldwell, N. J.;bids Nov. 10, E. Donald Sterner, state highway commissioner, Trenton, N. J.

200 tons, addition to livestock building, San Francisco; Golden Gate Iron Works, San Francisco, low.

200 tons, girder spans, for Pennsylvania railroad, Collier, W. Va.

200 tons, catalytic building, Catalytic Development Co., Marcus Hook, Pa.

165 tons, building, for Williams college, Williamstown, Mass.

160 tons, housing project, Lexington, Ky., for city.

160 tons, warehouse addition, for Owens-Illinois Glass Co., Newark, O.

150 tons, also 100 tons reinforcing bars, laboratory building, Frankford arsenal, Philadelphia; bids, Nov. 21.

150 tons, also 100 tons reinforcing bars, building for department of agriculture, Wynnewood, Pa.; bids Nov. 22.

150 tons, building, for Vita-Var Corp., Newark, N. J.

150 tons, state bridge FAGM-61-C, Wibaux, Mont.

150 tons, bridge over Central Railroad of New Jersey, West Carteret, N. J.; bids Nov. 10, E. Donald Sterner, state highway commissioner, Trenton.

125 tons, Northwood shopping center, Baltimore, for Roland Park Co.

120 tons, store building, for Langdon estate, Elmira, N. Y.

118 tons, underpass, University avenue, Palo Alto, Calif.; bids Nov. 6.

100 tons, building, zoological garden, Philadelphia, bids Nov. 8.

Unstated tonnage, gates, hoists, etc., municipal water system intake; bids at Bellingham, Wash., Nov. 2.

Unstated, gates and hoists, Roza dam project, Washington state; bids to Denver, Nov. 2.

Unstated, state bridge, Randolph Creek, Mont.; Sam Orino, Portland, Oreg., general contractor.

Unstated tonnage, two state steel bridges Ravelli county, Mont.; W. P. Roscoe, Billings, Mont., general contractor.

Reinforcing

Reinforcing Bar Prices, Page 77

Pittsburgh—Concrete bar sellers are still accepting orders, most of this business being for delivery in December or January. Mills are taxed to make early delivery of tonnage on hand. Inquiries are fairly heavy, mostly for public projects. Prices are firm.

Chicago—Large lots still are pending, including 19,000 tons for the local filtration plant, 1200 tons for government power magazines at Savanna, Ill., and 1800 tons for an industrial building here. Awards are headed by 950 tons for the Chicago subway.

New York—On light buying, concrete bar prices continue the firmest in a long period. Distributors are experiencing delivery problems in some instances. Pending tonnage is light except for housing projects, taking several thousand tons.

Seattle—Important projects are few but rolling mills have fair backlogs. Largest job pending is the Puget Sound navy yard graving dock which under revised plans may require less than 1000 tons. Bids opening at Washington were postponed from Oct. 18 to 25.

San Francisco—The reinforcing bar market is active and 5221 tons were placed last week, bringing the year's aggregate to 145,584 tons, compared with 119,743 tons for the corresponding period in 1938. Columbia Steel Co. secured 4350 tons for the bureau of reclamation for delivery at Redding, Calif.

Reinforcing Steel Awards

4350 tons, bureau of reclamation, invitation 33,333-A, Redding, Calif., to Columbia Steel Co., San Francisco.

950 tons, flood control, unit 3, Cambria county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.; A. J. Albrecht, Chicago, contractor.

950 tons, subway section S-4B, Chicago, to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, barracks and laundry and other buildings, specification 9159, Coco Sola, C. Z., to unnamed interest.

450 tons, cell blocks 9 to 10, Green Haven, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Amsterdam Building Co., contractor.

400 tons, housing, Perth Amboy, N. J., to Truscon Steel Co., Youngstown, O.; R. & G. Construction Co., contractor.

188 tons, bridges and highway work, Merced county, California, for state, to Gilmore Fabricators Inc., San Francisco.

150 tons, hangars, airfield, Pensacola, Fla., to Truscon Steel Co., Youngstown, O.; Virginia Engineering Co., Newport News, Va., contractor.

150 tons, bridge, Milton, Mass., to Northern Steel Co., Boston; M. Mateo & Sons, contractor.

144 tons, shop, boiler and utility buildings, Fort Wright, N. Y., to Ceco Steel Products Corp., Jersey City, N. J.; Branford Construction Co., Hartford, Conn., contractor.

125 tons, bridge, New London-Waterford, Conn., to Truscon Steel Co., Youngstown, O.

120 tons, storage building, municipal wharf, Providence, R. I., to Barker Steel Co., Cambridge, Mass.

120 tons, building, Illinois Bell Telephone Co., Chicago, to Inland Steel Co., Chicago.

110 tons, dormitory, state college, Arcadia, Calif., to Ceco Steel Products Corp., San Francisco.

105 tons, Klein Memorial building, Bridgeport, Conn., to Hunter & Haven, Bridgeport, through E. & F. Construction Co., Bridgeport.

100 tons, landing mat, Hickam Field, T. H., to unnamed interest.

100 tons, bridge, Barton, Vt., to Bancroft & Martin Rolling Mill Co., Portland, Me.; Littleton Construction Co., Littleton, N. H., contractor.

100 tons, school, Winnetka, Ill., to Republic Steel Corp., Cleveland; through O. J. Dean Co., Chicago.

Unstated, 55,000 square feet, building mesh, library wing, Sterling Hall of Medicine, Yale University, New Haven, Conn., to Joseph T. Ryerson & Son Inc., Chicago; Dwight Building Co., New Haven, contractor.

Reinforcing Steel Pending

3230 tons, bureau of reclamation, invitation 33,354-A, Coram, Calif.; bids opened.

3000 tons, housing project, Hartford, Conn.

3000 tons, second graving dock, navy yard, Bremerton, Wash.; bids postponed from Oct. 18 to Oct. 25.

2500 tons, housing project, Bridgeport, Conn.

2200 tons, housing project, Holyoke, Mass.

1200 tons, powder magazine, Savanna, Ill.; Midwest Construction Co., general contractor.

1200 tons, Anacostia sewage plant, Bladensburg, Va.

1000 tons, housing contract, Peoria, Ill.; Patrick Warren Construction Co., Chicago, low.

500 tons, barracks, Lowry field, Denver.

493 tons, bureau of reclamation, invitation 48,802-A, Rutledge, Texas; bids opened.

370 tons, highway projects, Livingston and Erie counties; bids in.

335 tons, tanker dock and bridge pier, Standard Oil Co., Bayway, N. J.

316 tons, paint shop and transformer building, navy yard, Mare Island, Calif., specification 8984; general contract to DeLucca & Son, 1795 Filbert street, San Francisco, at $170,700.

311 tons, University avenue underpass, Palo Alto, Calif.; bids Nov. 8.

300 tons, Pershing road housing, Zanesville, O.

280 tons, viaduct for New York Central, Eleventh avenue, New York; bids in.

270 tons, post warehouse and depot supply warehouse, invitation 6812-40-26, Hickam Field, T. H.; general contract to Robt. E. McKee, 4700 San Fernando boulevard, Los Angeles, at $604,000.

255 tons, bureau of reclamation, invitation 46,807-A, Rutledge, Texas; bids opened.

250 tons, sewage treatment plant, New London, Conn.; N. Benvenuit & Sons, New London, low.

219 tons, addition to Coca Cola plant, Oakland, Calif.; bids opened.

214 tons, bridges over Arroyo Seco at Parkway and Channel, Los Angeles; bids Nov. 1.

187 tons, bridge, Thirty-first street and Western avenue, Chicago; Strobel Construction Co., Chicago, low.

180 tons, mesh, warming-up apron, Hickam Field, T. H.; bids opened.

175 tons, dock, Alcatraz island, San Francisco; Duncanson-Harrelson, De Young building, San Francisco, low on general contract at $119,400.

155 tons, seaplane ramps, naval air base, Alameda, Calif.; bids opened.

150 tons, water department, Chicago.

150 tons, housing project, MacComb, Miss.; bids Oct. 24.

150 tons, two state custodial school buildings, Buckley, Wash.; Brady Construction Co., Seattle, general contractor.

136 tons, criminal courts building, New York, rebid.

100 tons, Bell Telephone building, Philadelphia; bids Nov. 6.

100 tons, gymnasium, Outer-Mission high school, San Francisco; bids thrown out.

Unstated, steel and concrete span, Beaver creek, Mont.; W. P. Roscoe Co., Billings, general contractor.

Unstated, state bridge, Sanders county, Montana; Peter Kiewet & Sons, Omaha, general contractor.

Unstated tonnage, office building, Mead-Johnson Co., Evansville, Ind.

Unstated tonnage, building, American Flange Mfg. Co., Chicago.

Concrete Bars Compared

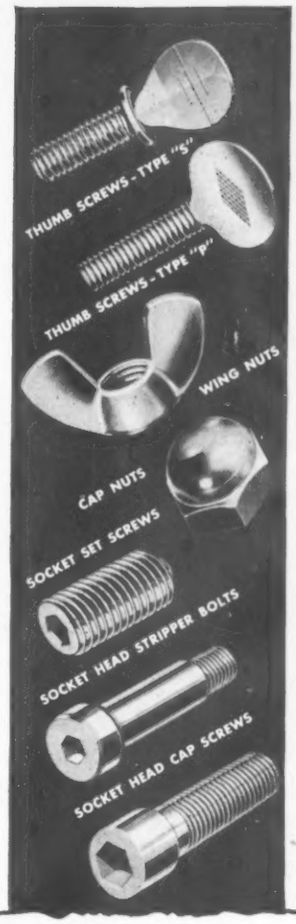
	Tons
Week ended Oct. 28	**9,112**
Week ended Oct. 21	**9,439**
Week ended Oct. 14	**11,081**
This week, 1938	**6,555**
Weekly average, year, 1938	**6,959**
Weekly average, 1939	**9,769**
Weekly average, September	**9,002**
Total to date, 1938	**287,243**
Total to date, 1939	**420,090**

Includes awards of 100 tons or more.

Ferroalloys

Ferroalloy Prices, Page 78

New York—October shipments of ferromanganese will compare favor-



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ably with September although possible slightly smaller as a result of last month's rush to anticipate expiration of low-price contracts. The market continues $100, duty paid, although as high as $107.50 is reported quoted on a small export tonnage for nearby shipment.

Pig Iron

Pig Iron Prices, Page 78

Pittsburgh—Sales continue light, most consumers being covered. Production still is rising, with three more blast furnaces about ready for operation. This will give the district 43 active stacks out of 50. More than 4700 out of 6061 available beehive coke ovens were operating in the district early last week. Coke prices are unchanged.

Cleveland—Shipments this month will set a new peak for the year to date and will top the September movement by 20 to 25 per cent, from present indications. Automotive labor trouble has had only a slight retarding effect on local foundries.

Chicago—October shipments are expected to be about 25 per cent larger than in September. Consumption still is expanding, most foundries being on a five-day week. A 15 per cent gain in foundry coke shipments is indicated this month. By-product foundry coke prices are being advanced 75 cents a ton.

Boston—Shipments are substantial, with some increase noted in small-lot buying. Foundry melt has improved materially, notably in the Connecticut area, and indications are specifications will expand. Talk of a possible price advance for first quarter continues.

New York—First quarter pig iron prices are not expected to be announced until steel quotations are decided. Opinion varies as to the extent pig iron may be affected. Shipments continue active but show little change since a month ago. Export demand is brisk, including an inquiry from Belgium. Sellers are not particularly interested in foreign business at this time.

Philadelphia—An advance in first quarter prices of about $2 a ton is considered likely in view of higher coke, ore and other costs. Most consumers are well booked through this quarter and partly into next year. Specifications are heavy, with October shipments probably the largest in recent years. The melt is higher at 80 to 85 per cent.

Buffalo—Buying has leveled off, but shipments are at the year's peak. Producers are able to fill orders for early delivery, although no iron is being piled despite output of nearly 80 per cent. Foundries are more active in practically all types of work.

Cincinnati—Deliveries have been retarded on some grades recently, but this condition is being corrected. Melters are specifying farther ahead and generally are increasing inventories along with consumption. Shipments this month are lighter than in September despite the increased melt.

St. Louis—Shipments continue to increase, but the melt is leveling off at the peak attained the middle of October. Some foundries are less active for seasonal reasons. Numerous inquiries have been received for first quarter iron, principally from small melters, but little has been placed.

Birmingham, Ala.—Production of pig iron continues at capacity with all 18 furnaces going, although there is reason to believe the strike of red ore miners at Woodward may result in some curtailment.

Toronto, Ont.—Sales are slow, but most melters are covered and shipments are above the average for the past year or two. Some spot buying of one or two cars is being done. Prices are firm and unchanged.

Scrap

Scrap Prices, Page 80

Pittsburgh—The market has a stronger tone, although sales still are small. Releases from mills have followed recent suspensions, and some steelworks previously out of the market are again offering to buy. Prices on such offers are not attractive. Most grades hold around recent levels.

Cleveland—Steady prices rule in the scrap market with shipments at normal rate but little buying. Cargoes from upper lake ports continue to arrive here to complete shipments before winter.

Chicago—Scrap is quiet, with quotations generally unchanged. Brokers are able to buy little or no heavy melting steel at less than $18.50 for No. 1 and are not anxious to sell to mills at $19. An upward trend in prices soon is regarded not unlikely in the trade.

Boston—Several grades have recovered part of recent declines, notably cast scrap for domestic consumption, and for the time being the price sag appears to have halted. The export market is uncertain, although prices for dock delivery are holding. Sinking of the Greek steamer KONSTANTINOS HADJIPATERAS, out of Boston Oct. 6 with 7200 tons, makes the second freighter laden with district scrap for England sunk in the war zone.

New York—Scrap buying is light although one eastern Pennsylvania steel works has re-entered the market for some tonnage. Brokers report shipments are held up in some instances. Prices generally are unchanged with buyers inclined to resist advances.

Philadelphia—A few adjustments in scrap prices have been made but the market appears to be at a resistance level and no further decline seems imminent. Material is coming out more freely with coverage against contracts on the basis of $20 for No. 1 heavy melting steel and $18.50 for No. 2 steel, with 50 cents premium offered in some instances for round tonnages. Exports prices are at practically the same level.

Buffalo—Dealers are busy shipping against old scrap orders, with the market for new business quiet and prices unchanged. No. 1 steel holds at $21 to $21.50. Little difficulty is met in obtaining sufficient supplies to cover orders.

Detroit—Prices are steady, although some moderate increases are in prospect. Nearly all scrap accumulated locally has been sold, and melters will be forced to enter the market within a few weeks because of depleted supplies.

Cincinnati—Prices are off 50 cents on all grades except rerolling rails which are up a like amount. Consumer buying is quieter, but some dealers regard current price weakness as temporary. Local shipments are steady.

St. Louis—The market has steadied, following recent easiness. Several items, including No. 2 steel, are slightly higher. Consumer interest is quieter locally, although eastern buyers are seeking scrap here. Offerings by country dealers declined with the easing of prices earlier this month and continue moderate.

Birmingham, Ala. — Scrap remains firm, although there is indication of some easing over the past week. No. 1 and No. 2 heavy melting, and No. 1 cast are in greatest demand.

Seattle—Scrap is in strong demand and while receipts from the interior have been stimulated by higher prices, tidewater stocks are still below normal. Japan is buying in small lots but in more steady volume. Rolling mills are buying as their needs develop but demand from foundries shows little improvement.

Toronto, Ont.—Prices of several grades have been raised 50 to 75

cents. Dealers are offering $11.25 for No. 1 steel, $9.75 for bundled sheets and $6.50 for sheet clippings. Iron grades are firm but unchanged. Heavier offerings have appeared at the higher prices. Dealers are accepting only short term contracts.

Steel in Europe

Foreign Steel Prices, Page 79

London—(*By Cable*)—Commercial users of finished steel in Great Britain are awaiting announcement of new prices, expected in November, before placing further orders. Expansion of hematite pig iron demand is breaking into reserve stock while increased production of this grade is dependent on ore supplies. All departments of steel mills are producing at capacity and delivery to commercial consumers are delayed.

Belgium and Luxemburg report heavier export demand, particularly for shipment to Great Britain and Holland, outstrips available tonnages.

Government Places First Strategic Mineral Order

The government has placed its first contract under the strategic and critical materials act, Wah Chang Trading Corp. last week receiving an order for 425 short tons of tungsten ore from the procurement division of the treasury department. The low bid was $15.82 per unit, exclusive of duty, making a total price of $427,140. This is stated to be the only tungsten contract to be placed at this time. The successful bid, figuring to $23.75 per short ton unit, duty paid, is in line with the recent market.

Government Iron, Steel Awards Total $856,976

During the week ended Oct. 21, the government purchased $856,976.01 worth of iron and steel products under the Walsh-Healey act as follows: Barnard Aviation Equipment Co. Inc., Newark, N. J., $17,290; Wehr Steel Co., Milwaukee, $13,923.44; Detroit Steel Castings Co., Detroit, $27,279.07; the Buckeye Traction Ditcher Co., Findlay, O., $25,316 (estimated); Struthers Wells-Titusville Corp., Titusville Forge division, Titusville, Pa., $31,434.19; Graybar Electric Co. Inc., Denver, $16,500; Laclede Steel Co., St. Louis, $21,730.40; Gilmore Steel & Supply Co. Inc., San Francisco, $14,680.62; Crucible Steel Co. of America, New York, $53,919.25 (estimated); Judson Steel Corp., Oakland, Calif., $12,467; Bethlehem Steel Co., San Francisco, $12,417.50; Bethlehem Steel Co., Bethlehem, Pa., $13,242.39; Carnegie-Illinois Steel Corp., Washington, $48,700 (estimated); Bethlehem Steel Export Corp., New York, $10,576; Central Iron & Steel Co., Harrisburg, Pa., $115,837.50 (estimated); Allegheny Ludlum Steel Corp., Pittsburgh, Pa., $60,179.40; Joseph P. Cattie & Brothers Inc., Philadelphia, $31,500 (estimated); Rust Furnace Co., Pittsburgh, Pa., $13,492; Elliott Co., Pittsburgh, $74,760.50; Cochrane Corp., Philadelphia, $78,065; Kennedy Mfg. Co., Van Wert, O., $23,146.26; Parish Pressed Steel Co., Reading, Pa., $17,503.20; Columbia Machine Works & Malleable Iron Co., Brooklyn, N. Y. $15,756; Bridgeport Thermostat Co. Inc., Bridgeport, Conn., $53,609.83; Mitchell Metal Products Inc., Cleveland, $23,240.10; Martin-Parry Corp., York, Pa., $10,232.77; and Thorrez & Maes Mfg. Co., Jackson, Mich., $20,157.59.

Warehouse

Warehouse Prices, Page 79

Pittsburgh—Stocks of some products are depleted in certain sizes, warehouses experiencing delays in shipments from mills. Prices are strong on all items.

Cleveland—October sales are holding 25 to 30 per cent ahead of September. Most improvement results from expanding consumption. Distributors' stocks generally are adequate.

Chicago—Demand continues active, but pressure from warehouse customers has lessened with accommodation of the initial upturn in requirements. October sales will top those of September.

New York—October volume is far above September and the best month of the year with some distributors. Galvanized sheet prices have been advanced 34 cents per 100 pounds.

Philadelphia — Effective Nov. 1 new quantity differentials become effective on hot-rolled products, representing an advance of 10 cents per 100 pounds on quantities 2000 pounds and over. Heavy demand is reducing stocks.

Buffalo—Business shows further gains. Larger consumers occasionally are turning to warehouses for prompt delivery they are unable to get from mills.

Cincinnati—Business gains this month average about 20 per cent. Only building needs have failed to share in the improved demand.

St. Louis—Demand is the most diversified in months as to products and buyers. Stocks generally are

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adequate not complete in all items.

Seattle—Volume continues steady with sheets and light plates leading. Local dealers still face lower prices on some items compared with Portland.

Nonferrous Metals

New York—Although undertone of all major nonferrous metal markets remained firm last week, buying interest was only moderate and offerings generally were freer. Interest was centered in the active rate of shipments which reflected the high level of actual consumption.

Copper—Copper and brass mills are operating practically at capacity. Mills have shown little interest in the heavy inquiries from abroad since they are booked far ahead with domestic orders. All first hands continued to quote electrolytic at 12.50c, Connecticut, while resellers asked about 13.00c for prompt delivery. Export copper hovered just under the 13-cent f.a.s. level and appeared strong on the report that Britain may not be able to fully satisfy French demand from Dominion sources. French interests have paid up to 14.00c for metal in their own warehouses.

Lead—Producers continued to balance their day's intake quite easily and maintained waiting lists in some directions. Prices held on the basis of 5.35c, East St. Louis.

Zinc—Prime western zinc remained steady at 6.50c, East St. Louis, reflecting the advance in the galvanized sheet output rate to 79 per cent of capacity, a new high for recent years. Sellers offered more freely but showed no concern over the light volume of new demand.

Tin—Prices remained entirely nominal throughout the week with Straits spot ranging from 55.00c to 56.00c. Supplies remained tight due in part to difficulty in covering in the East and the tightening of export licenses on English refined pending arrival of additional ore supplies in England.

September Ore Imports Close to Year's Lowest

Baltimore—September iron ore arrivals of 161,603 tons were the lightest, this year, except for 157,854 tons in May. They compared with 200,071 tons in August and 268,035, in July, with the latter the largest total this year.

Importations of iron ore for the first nine months totaled 1,702,648 tons, compared with 1,396,298 tons in the corresponding period last year.

Manganese ore arrivals last month aggregated 34,384 tons, against 52,850 tons in August, which was the heaviest of the year. Arrivals for the first nine months were 286,748 tons, compared with 348,632 in the corresponding period last year.

Iron Ore

Iron Ore Prices, Page 80

New York—Government action on bids submitted Oct. 19 by manganese ore sellers is expected not later than Oct. 30, as there is a 10-day limitation clause.

As prices submitted are more fully analyzed, it appears that the market on high grade ore, as quoted by leading sellers, ranges around 48.50c to 50.00c, without duty, Atlantic seaboard.

However, should the government make no award, the situation will probably remain confused, indicating a continued gap between buyers and sellers which might not soon be bridged.

Sellers have indicated such prices as above mentioned since soon after the European war began, but private consumers have felt that they were far too high, and inasmuch as the latter had good stocks on hand and under contract, they decided they could await developments for a time without the market getting too far away from them.

Many looked to the recent government opening to supply an interesting test. The prices, as it developed, held fairly in line, but the fact yet remains to be seen as to whether the government is interested at these levels.

No bids were submitted on Indian and West African Gold Coast ore, it is pointed out.

Equipment

Seattle—Volume of sales is being well maintained, electrical and pumping items being rather active. Pennsylvania Transformer Co. is low at Tacoma, $14,450 for furnishing five transformers for the Ft. Lewis substation, and $13,600 for three transformers for the Cedar street station. Bonneville authority, Portland, will receive tenders Nov. 15 for conductor and overhead wire and hardware for two power lines in Washington state, Spec. 591.

Nonferrous Metal Prices

	Copper			Straits Tin, New York							
Oct.	Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	*Spot	*Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
21	12.50	12.50	12.12½	55.00	49.50	5.50	5.35	6.50	20.00	14.00	35.00
23	12.50	12.50	12.12½	55.50	49.50	5.50	5.35	6.50	20.00	14.00	35.00
24	12.50	12.50	12.12½	55.75	49.50	5.50	5.35	6.50	20.00	14.00	35.00
25	12.50	12.50	12.12½	55.75	49.75	5.50	5.35	6.50	20.00	14.00	35.00
26	12.50	12.50	12.12½	56.00	49.75	5.50	5.35	6.50	20.00	14.00	35.00
27	12.50	12.50	12.12½	55.75	49.50	5.50	5.35	6.50	20.00	14.00	35.00

*Nominal.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 12.50c Conn. copper

Sheets

Yellow brass (high)	19.06
Copper, hot rolled	20.87
Lead, cut to jobbers	8.30
Zinc, 100 lb. base	11.25

Tubes

High yellow brass	21.81
Seamless copper	21.37

Rods

High yellow brass	15.23
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.31

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	8.37½-8.50
Cleveland	9.25-9.50
Chicago	8.75-9.00
St. Louis	8.50-8.75

Heavy Copper and Wire

New York, No. 1	10.00-10.25
Cleveland, No. 1	10.25-10.50
Chicago, No. 1	10.00-10.25
St. Louis	9.75-10.00

Composition Brass Turnings

New York	8.00-8.25

Light Copper

New York	8.00-8.25
Cleveland	8.25-8.50
Chicago	7.87½-8.12½
St. Louis	7.75-8.00

Light Brass

Cleveland	5.00-5.25
Chicago	5.62½-5.87½
St. Louis	5.00-5.50

Lead

New York	4.85
Cleveland	4.62½-4.75
Chicago	4.25-4.50
St. Louis	4.00-4.25

Zinc

New York	3.50-3.75
Cleveland	3.25-3.50
St. Louis	3.75-4.00

Aluminum

Mixed, cast, Cleveland	9.75-10.00
Borings, Cleveland	7.25-7.50
Clips, soft, Cleveland	16.00-16.50
Misc. cast, St. Louis	8.25-8.50

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads	13.75
Standard No. 12 aluminum	14.00-15.00

Construction and Enterprise

Ohio

CINCINNATI—Ohio farm bureau cooperative association plans five fertilizer manufacturing and storage plants, to cost about $500,000. W. W. Carlton, 1816 Central parkway, engineer.

CLEVELAND—City, George C. Oxer, City hall, commissioner, light and power division, is taking bids to noon, Nov. 10, on purchase and installation of dust and ash-handling systems. Plans filed with Peter F. Loftus, 632 Oliver building, Pittsburgh, consulting engineer. Certified check 5 per cent to accompany bid.

CLEVELAND—City, George C. Oxer, City hall, commissioner, light and power division, is taking bids to noon, Nov. 10, on purchase and installation of one traveling bridge crane and auxiliary hoists. Specifications filed with Peter F. Loftus, 632 Oliver building, Pittsburgh, consulting engineer. Certified check 5 per cent to accompany bid.

CLEVELAND—Cleveland Electric Illuminating Co., E. G. Crawford, 45 Public square, president, plans construction of new electric power plant. To include 60,000 kilowatt steam driven turbogenerator, equipped with ash precipitation equipment; two new pulverized fuel boilers; screen house with capacity to screen 320,000,000 gallons of water daily. Total cost to be about $6,300,000 of which $1,500,000 is for buildings and appurtenances. Private plans being completed; construction to start in early spring of 1940.

COSHOCTON, O.—Tuscarawas-Coshocton Electric Co-operative Inc., Lewis E. Buehler, superintendent, plans construction of 70 miles rural transmission line to cost about $70,000.

MEDINA, O.—Village, S. F. High, acting mayor, plans purchase and installation of one diesel engine and high service centrifugal water pump, one low service water pump and motor to operate same. Cost not to exceed $10,000.

NORTH BALTIMORE, O. — Village, Fred Halboth, mayor, contemplating installation of new municipal power and light system with PWA assistance. Includes two 450 horsepower and one 375 horsepower diesel engines, white way lighting system, other equipment. Estimated cost, $194,671. C. J. Simon, Crane Central building, Van Wert, O., consulting engineer. Plans complete, but project still before Ohio supreme court.

ORVILLE, O.—Village, R. A. Kinney, president, board of public affairs, is taking bids to noon, Nov. 8, on one 2500 kilowatt turbogenerator and auxiliaries; one surface condenser; circulating and condensate pumps and auxiliaries. Estimated cost, $95,000. Ralph Hadlow, 700 Prospect street, consulting engineer. Certified check 10 per cent to accompany bid.

Connecticut

WEST HAVEN, CONN. — Armstrong Rubber Co., 475 Elm street, is completing plans for 4-story factory addition, 100 x 180 feet, to cost about $200,000.

Maine

AUGUSTA, ME.—Westinghouse Electric & Mfg. Co., J. R. McGilvray, 10 High street, Boston, New England service manager, is altering and repairing plant, installing new equipment.

New York

GROTON, N. Y.—L. C. Smith & Corona Typewriter Corp. plans $40,000 plant addition.

New Jersey

NEWARK, N. J.—P. Ballantine & Sons, 57 Freeman street, plan plant to cost about $200,000 with equipment. J. Shanley, 33 Washington street, architect.

Illinois

CHICAGO—Nottingham Steel Co., Earl Heffley, general manager, will erect new plant with floor capacity of 25,000 square feet. To be fully equipped, including two cranes with 60 foot spans.

Indiana

VERSAILLES, IND. — City, E. H. Bailey, town board chairman, will take bids soon on one 300 to 350 gallons per minute multistage horizontal centrifugal electric driven pump; one 300 to 350 gallons per minute dual electric-gas engine driven pump, multistage, horizontal centrifugal; and two 250 gallons per minute close coupled centrifugal pumps. Lewis S. Finch, 276 Century building, Indianapolis, engineer.

South Carolina

CHARLESTON, S. C.—Rathborne, Hair & Ridgway Co., 1440 West Twenty-first place, Chicago, manufacturer of wooden packing and shipping cases, plans installation of motors and controls, conveyors, transformers and accessories, and other equipment in proposed new mill here. Power house to be built also; work begins soon. Entire project to cost nearly $450,000.

Louisiana

NACHITOCHES, LA.—Nachitoches Rural Electric Co-operative Corp., R. W. Chanaberry Inc., 1001-4 Realty building, Louisville, Ky., engineer, has $75,000 REA fund for 130 miles rural transmission line, will take bids soon.

Kentucky

GLASGOW, KY. –Clark Rural Electric Corp., T. E. Steele, superintendent, takes bids soon on 98 miles rural transmission line in six counties. $80,000 REA allotment available. R. W. Chanaberry Inc., 1001-4 Realty building, Louisville, Ky., engineer.

Missouri

KANSAS CITY, MO.—American Compressed Steel Corp., 1300 Woodrow street, Cincinnati, plans installation of electric furnace unit, motors and controls, conveyors, electric hoists and other equipment in new branch mill in Woodswether district, for processing light steel scrap into steel specialties. Cost reported close to $200,000. (Noted Oct. 2.)

NORTH KANSAS CITY, MO.—Alabama Pipe Co., Anniston, Ala., plans pipe manufacturing plant to cost $200,000 here.

ST. LOUIS—Blanton Co., 318 Second street, plans installation of motors and controls, conveyors, regulators, loaders and other equipment to cost over $350,000.

TRENTON, MO.—Grundy Electric Co-operative Inc., Dr. C. Cullers, correspondent, has $125,000 REA allotment for 150 miles rural transmission line in Sullivan county.

Arkansas

BERRYVILLE, ARK.—Carroll Electric Co-operative Corp. has been granted $372,000 REA loan for rural transmission line.

WATERLOO, ARK.—Williams Roofing Co. main plant damaged by fire, loss about $100,000.

Oklahoma

BLACKWELL, OKLA.—Kay electric co-operative, Adolph Knesek, superintendent, has been granted $62,000 REA loan for 83 miles rural transmission line.

HOLLIS, OKLA.—Harmon electric co-operative has $81,000 REA loan for 150 miles rural transmission line in Harmon and Greer counties. Mid West Engineering Co., Tulsa., engineer.

Wisconsin

ALMA, WIS. — Buffalo Electric co-operative, E. A. Haeuser, superintend-

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ent, has been granted $139,000 REA loan for 132 miles rural transmission line.

ARCADIA, WIS.—Trempealeau electric co-operative, M. J. Lawrence, superintendent, has $73,000 REA loan for 76 miles rural transmission line in Trempealeau county.

BARABOO, WIS.—Gunnison Mfg. Co., Madison, Wis., bituminous road building machinery manufacturer, will erect 1-story factory, 32 x 72 feet.

IOLA, WIS. — Waupaca electric co-operative, Louis R. Rasmussen, superintendent, will build 139 miles rural transmission line with $148,000 REA loan.

LANCASTER, WIS.—Farmers' Telephone Co. has been granted authority to purchase site, construct new building and install switchboard and outside cable plant, to cost $11,000, by Wisconsin public service commission. New automatic equipment will be installed.

MADISON, WIS.—Kupfer Foundry & Iron Co., 629 East Mifflin street, plans to erect building for indoor storage of fabricated steel and iron work.

MENASHA, WIS. — General Chemical Co., 105 West Madison street, Chicago, has purchased site, plans construction of chemical manufacturing plant.

MILWAUKEE — Chicago, Milwaukee, St. Paul & Pacific Railway Co. plans extensive improvements to wheel foundry at West Milwaukee shops. Fred M. Sloan, Milwaukee, division engineer.

Minnesota

KETTLE RIVER, MINN.—REA examining division has approved proposed construction of additional rural transmission lines by Carlton county power co-operative, Matt O. Wilson, manager.

Texas

AUSTIN, TEX.—City contemplates construction of electric power station in Westfield addition; to cost about $30,000.

CAYUGA, TEX.—Tide Water Associated Oil Co., Esperson building, Houston, Tex., and 17 Battery place, New York, plans installation of motors and controls, conveyors, air compressors, electric pumping machinery and other equipment in new oil refinery and recycling plant. Entire project to cost about $1,500,000.

EAGLE PASS, TEX. — Molybdenum Corp. of America, 500 Fifth avenue, New York, will construct concentrating plant here; to treat tungsten bearing substance developed by Arturo L. Gonzales, Monterrey, Mex., and associates in Ocampo district, state of Mexico.

HOUSTON, TEX.—City, Oscar F. Holcombe, mayor, votes on special $400,000 bond issue for construction of incinerator, Nov. 4.

SAN AUGUSTINE, TEX.—City will receive bids in about one week for power plant improvements, installation of 300 kilowatt diesel generating unit, other equipment. H. B. Gieb, Mercantile building, Dallas, Tex., engineer.

South Dakota

VERMILLION, S. DAK.—South Dakota university, D. W. Loucks, Pierre, S. Dak., state engineer, plans installation of new boiler and auxiliary equipment; to cost about $25,000.

Nebraska

CENTRAL CITY, NEBR. — Merrick county rural public power district has filed application with state railway commission for authority to construct 109 miles rural transmission line in Merrick county.

Iowa

CEDAR FALLS, IOWA—City, H. B. Philpot, clerk, is contemplating construction of hydroelectric plant early in 1940. Clark N. Streeter, city engineer.

McGREGOR, IOWA—Voters have approved $120,000 bond issue to finance construction of municipal power and light plant. Young & Stanley, Muscatine, Iowa, consulting engineers; W. R. Stone, town clerk. (Noted Oct. 2.)

OELWEIN, IOWA—City, H. J. Finders, clerk, has employed Hubbard Engineering Co., 80 East Jackson street, Chicago, to conduct survey for construction of municipal power and light plant.

ROCK RAPIDS, IOWA—Champlain Refining Co. plans construction of refinery and establishment of headquarters plant to cost about $250,000.

Wyoming

LARAMIE, WYO.—Union Pacific Railroad Co., Omaha, Nebr., will construct water treatment plant to cost $65,000 here.

THERMOPOLIS, WYO.—Hot Springs county rural electric association plans 70 miles rural transmission line to cost about $100,000.

Montana

GREAT FALLS, MONT.—Volk Brewery Co., Charles E. Volk, proprietor, plans construction of bottling plant, 50 x 100 feet, to cost about $75,000 with equipment.

HUNTLEY, MONT.—Yellowstone valley electric co-operative, J. E. Pickens, superintendent, has been allotted $74,500 REA grant to finance construction of 58 miles rural transmission line in Yellowstone county. J. M. Garrison, state water conservation board, Helena, Mont., consulting engineer.

TROUT CREEK, MONT.—Sanders electric co-operative, George E. Graham, superintendent, has been granted $29,000 REA loan to finance construction of 10 miles rural transmission line in Sanders county.

Idaho

LEWISTON, IDAHO—Columbia county rural electric association, T. C. Smith, chief engineer, announces plans are in preparation and bids will be invited soon on construction of 70 miles rural transmission line in Columbia county.

MALTA, IDAHO—Raft River Rural Electric Co-operative Inc., J. R. Eames, president, plans 97 miles rural transmission line in Cassia and Box Elder counties. $111,000 REA allotment available.

MOSCOW, IDAHO — University of Idaho regents will receive bids Nov. 11 at Pocatello, Idaho, for construction of heating plant on local campus; to cost $90,000.

SANDPOINT, IDAHO—Northern Idaho rural electrification rehabilitation association has plans maturing for hydroelectric power plant on Priest Lake, including power dam, generating station, switchboard and auxiliary structures, about 46 miles rural transmission line. Entire project to cost about $196,000.

WALLACE, IDAHO—Tamrack & Custer Consolidated Mining Co., J. J. Day, president, announces plans for $75,000 flotation concentrating plant; 300-ton capacity.

Pacific Coast

HYNES, CALIF. — F. Zamboni and associates plan ice skating rink, 100 x 202 feet, to cost about $40,000.

LOS ANGELES—L. T. Sepin has been granted certificate to conduct business under firm name of American Metal Rolling Co., 541 Ceres avenue.

LOS ANGELES—James A. Tollar and Stanley Twaroski have been granted certificate to conduct business under firm name of Tollar Mechanical Works, 7239 Santa Monica boulevard.

LOS ANGELES—Building permit has been issued for construction of 53 x 400 foot addition to factory building of Young Spring & Wire Co., 3200 East Slauson avenue; to cost $20,000.

LOS ANGELES—Bruno H. Schubert has been granted certificate to conduct business under firm name of Slauson Pattern & Mfg. Co., 2618 East Fifty-fourth street.

LOS ANGELES—Lawrence Levin has been awarded certificate to conduct business under firm name of Lawrence Pipe Co., 5030 Long Beach boulevard.

LOS ANGELES—Certificate to conduct business under firm name of Bronze Bushing Co. Ltd., 6329 Wilmington avenue, has been granted to the owners: Lenora M. Brandt, general partner, and William J. Walmsley, limited partner.

LOS ANGELES—California Nut & Bolt Corp. has completed a new building for manufacture of pole line materials. Galvanizing department to be installed to treat products fabricated.

LOS ANGELES—Cortes Lock Corp. has been formed in Los Angeles county with capital stock of $100,000. Frank J. Barry, Frank Vasquez, Los Angeles, and John Brooks, Hawthorne, Calif., are directors.

LOS ANGELES—Soil Core Barrel Co., oil tool concern, has been incorporated in Los Angeles county; capital stock, $500,000. Arthur Soll, L. A. Larson, M. L.Taylor, Compton, Calif., are directors. Hibbard & Kleindienst, Kerckhoff building, attorneys and representatives.

PASADENA, CALIF.—W. Cunningham and Lefty MacDonald will take bids soon on outdoor skating rink, 110 x 230 feet, to cost $90,000. Godfrey Bailey, 1308 Four street, Los Angeles, architect.

SAN BERNARDINO, CALIF. — Big Bear lake sewer district plans special bond issue election Nov. 14 for complete sewerage system, to cost $196,000. H. L. Way, court house, county engineer.

PORT ORFORD, OREG.—Ore-Trans-Pacific Lumber Co. is building lath mill with separate power plant installation.

TOLEDO, OREG.—Bittner Log & Lumber Co. shingle mill recently damaged by fire to extent of $30,000.

DAYTON, WASH. — Columbia county rural electrification association, T. C. Smith, Lewistown, Idaho, engineer, will take bids soon on 70 miles rural transmission line to cost about $70,000.

KELSO, WASH.—Cowlitz county public utilities district has $40,000 for 45 miles rural transmission line.

KITTITAS, WASH.—Kittitas Diatomite Co., F. E. Kern, manager, whose mill was recently destroyed by fire, plans to reopen at new site, will need some machinery.

TACOMA, WASH.—Truck Parts & Engineering Co. Inc., capital $10,000, has filed papers of incorporation.

Canada

VANCOUVER, B. C.—Canadian Nut Co. Ltd., Mainland street, will reconstruct plant. Private plans; to cost $75,000.

WORTHINGTON, ONT. — Dennison Mines Ltd., 217 Bay street, Toronto, Que., plans erection of 250 capacity concentrator.

READER Comments

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

South Pioneer in Iron Buildings

To the Editor:

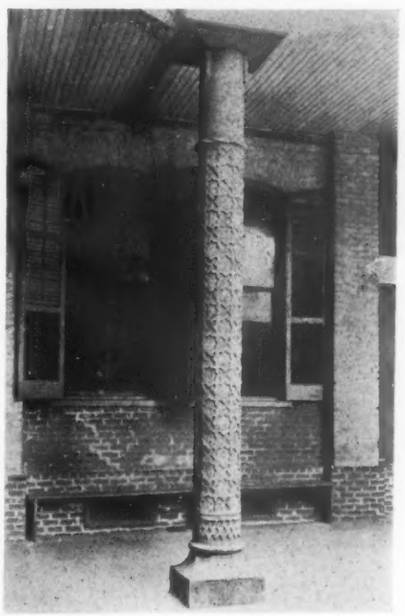
Erection of buildings largely of iron was undertaken by the federal government as early as 1856, as shown by the following excerpt from *DeBow's Review*, May, 1856:

"The erection of a new hospital at New Orleans, under appropriation from the federal government, furnishes an opportunity of introducing iron buildings for public purposes, which will no doubt lead to a vastly extended consumption of that material, now so important an American interest.

"We extract from the proposals of the Treasury:

'Proposals will at the same time be received for a building, similar to that called for by the specifications except that the main or exterior walls will be constructed of an iron veneering, upon iron frames, filled with some non-conducting substances, thus making the structure fire-proof, according to a supplement to the specifications. Persons submitting such proposals will give minute details of fastening the vertical and horizontal frames composing the walls; of filling them; of the style or ornamentation, etc. Persons may submit plans for an iron building of an equal or smaller size than that called for by the specifications, though conforming generally to the shape and plan.'

"The idea of this new and useful consumption of American iron on the part of the government has been practically suggested by the accomplished scientific engineer at the head of the Bureau of Construction of the Treasury Department, Captain A. H. Bowman. Simultaneous with his assumption of office, he caused to be instituted a series of experiments to test the adaptation of iron to the various purposes of a building material, which resulted in the introduction of iron beams and girding, to a large extent, in all the new buildings erected by the Secretary of the Treasury, under the superintendence of this officer. He has also, with the encouragement and support of the Secretary of the Treasury, caused iron to be extensively employed for the interior construction of buildings generally. And now, as we have seen, an important step has been taken by the Treasury Department toward the adoption of iron as a building material, for the exterior as well as the interior of public edifices."



Ornamental cast iron pillar in New Orleans house

The column pictured is from the first iron building erected in New Orleans. The building was to have been entirely of iron, but before the work was completed the War Between the States began, and the iron foundries which had been casting the parts turned their machinery to the making of munitions. Most of the iron work was done in the foundries which made the machinery for cotton ginning. The column pictured was cast at Holly Springs, Miss.

When the final iron was not available, the building was completed with wood. Its final history is tragic. It burned!

MARY WILLIS SHUEY
902 *Prospect avenue,*
Shreveport, La.

Leveling the Scrap Curve

To the Editor:

Suggestion by E. C. Barringer, executive secretary, Institute of Scrap Iron and Steel Inc., that steelmakers could have modified the recent bulge in scrap prices by accumulating larger reserves early in the year, (STEEL, Oct. 30, p. 20) is worthy some thought by scrap consumers.

Any action looking toward leveling demand and thus avoiding sharp price increases is of value to the entire industry, but if melters had the foresight early in the year to buy scrap to afford a three-month stockpile it is probable prices would have moved up from the $15 level he mentions. However, they probably would not have reached the present levels, which resulted from a scramble to cover enlarged needs.

Since both dealers and consumers would appreciate stable prices, without the usual peaks and valleys, this is an opportunity to work out a plan for keeping stocks well up, to meet unexpected contingencies. Perhaps the institute can suggest a means to bring about something along this line.

MELTER
Philadelphia

Threading Cost Reduced 80%

A typical example of the savings which may be effected by the use of modern production methods is that of threading valve seat rings.

These seat rings, 7⅝" in diameter, are made from stainless steel forgings of 280-320 Brinell hardness. The thread is 12 Pitch U.S.F., ⅞" long. The 32 EX Landmatic Head —the hand opening type—is used to thread these seat rings at a cost of 1¼ cents each. By a previous method the threading cost was 8½ cents each—thus, a reduction of 80% is effected.

LANDISize your Threads—Write for Bulletin No. F-90 today, covering LANDMATIC Heads.

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